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AMAZING STORIES

Scientific Fiction

Vol. 5 November, 1930 No. 8

In Our Next Issue

THE ECLIPSE SPECIAL, by William Lemkin, Ph.D. The time for the observation of a total eclipse of the sun is measured by seconds. And the seconds are so supremely valuable that the scientists, who are busy with their apparatus, do not get a chance to see it. What superb results might be obtained if some means were found to arrange matters so that hours, instead of seconds, could be spent in studying this greatest cosmic phenomenon that ever greets the earth. Dr. Lemkin, himself a scientist, gives us some unique ideas in this excellently written story.

THE SECOND MISSILE, by Earl Repp. Strange and unexplainable matter has been projected to the earth—nobody knows exactly from where. Stories have been written about foreign missiles, but this tale stands alone in its unusual interest. This is one of the best stories we have seen by this author.

THE BLACK HAND, by Charles Bowers Gardner. What wonders surgery of the future may develop must certainly be beyond the scope of human prophecy. However, it must be of supreme importance to consider the psychological effects of any amazing surgical possibility on the patient. One well-known physician and writer said of this story: "It tickles me pink."

ANACHRONISM, by Charles Cloukey. Numerous requests have come to us for a sequel to this author's "Paradox" stories. Here it is at last, beyond even the expectations of the fans. Yet those of our readers who have missed the two preceding stories will find in this a fascinating tale of scientific interest, for "Anachronism" is complete in itself.

THE DRUMS OF TAPAJOS, by Capt. S. P. Meek, U. S. A. (A Serial in three parts) Part II. Those who have read the first instalment of this absorbing novel, need no urging to read further. Those of our readers who have missed the previous issue should get it now. There's a treat in store for them.

Other scientific fiction.

In Our November Issue

The Drums of Tapajos
By Capt. S. P. Meek, U. S. A. 678
Illustrated by Paul

The Globoid Terror
By R. F. Starzl 700
Illustrated by Morey

Solarite
By John W. Campbell, Jr. 706
Illustrated by Wesso

The Pineal Stimulator
By I. M. Stephens and Fletcher Pratt 737
Illustrated by Paul

What Do You Know?
(Science Questionnaire) 743

Missionaries from the Sky
By Stanton A. Coblentz 744
Illustrated by Paul

The Cosmic Express
By Jack Williamson 752
Illustrated by Morey

Discussions 757

Our Cover

this month illustrates a scene from "The Globoid Terror," by R. F. Starzl, in which the sea-monster is shown with its victims in its inimical power, just before the end.

Illustration by Morey

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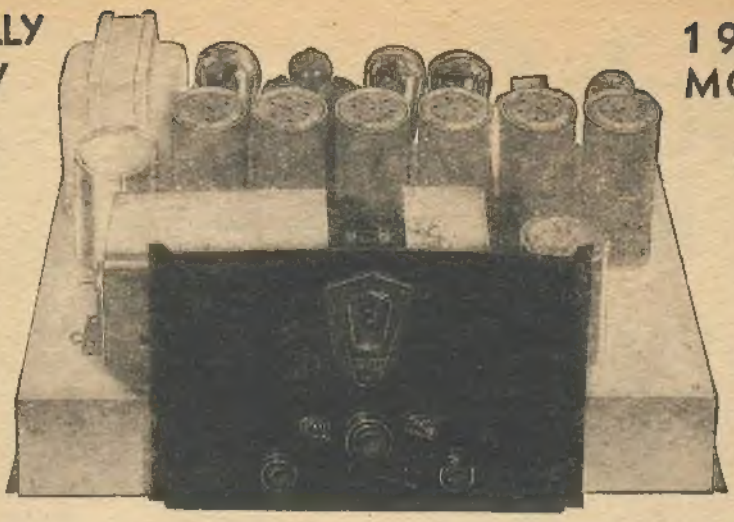

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VOLUME 5

AMAZING STORIES

THE MAGAZINE OF SCIENTIFICTION

NOVEMBER, 1930 No. 8

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Editorial and General Offices: 381 Fourth Avenue, New York, N. Y.

Extravagant Fiction Today - - - - - - - - - Cold Fact Tomorrow

Unbinding Matter

By T. O'Conor Sloane, Ph.D.

THE original idea of the atom, or the "indivisible," corresponded pretty closely to our idea of the molecule. A hundred and fifty years ago the break was looming through the clouds, and with the work of Lavoisier and of Priestly modern chemistry came into being. The old-time atom of wood, of water and of all the other substances in nature disappeared and its place was taken by the molecule. The smallest particle of water, for instance, which could exist was now called a molecule of water, not an atom, as it was before. It was taken as made up of two atoms of hydrogen and one of oxygen. This is still the accepted theory. A step far in advance of the old theory, it is by the last advances in the theory of the constitution of matter modified by the discrete (not the discreet) theory of matter, and the atom is no longer taken to be an indivisible body, but is a compound of a greater or less number of electrons, positive and negative in equal number. The positive electrons are called protons. The electrons are the "bricks," as it were, the quanta of matter.

The chemist of fifty years ago would be amazed if he could have foreseen the refinement in chemical work and laboratory practice that was coming to pass. In taking visitors through a laboratory, the delicacy of the balance was shown by cutting two hairs from different heads to an equal length and showing how the balance would show a difference in weight between them. But the modern chemist's balance may be ten times as delicate as the old-time ones. So when the atom was investigated and was found to consist of a considerable number of electrons and protons (in uranium there are hundreds of electrons), the modern atom became a very decidedly compound body, an accumulation of electrons. The chemist's unit was refined again.

Many of the atoms cannot under ordinary circumstances exist alone. Each one of these must be combined with a partner, as it were, with another atom either of its own kind or with another one. Thus united they form a molecule. Other molecules have only one atom. Very recently a way has been found of splitting a two atomic molecule into its atoms. If hydrogen gas, which is a collection of molecules of this element, each molecule made up of two atoms, is passed through a voltaic arc, the intense heat splits it up, it is believed, into two atoms. The gas is said to be activated. The atoms are driven apart by the intense heat, but have an intense affinity for each other, and as they emerge from the arc, reunite, producing an extremely high temperature. This principle has already been used to give the metal-worker a most powerful blowpipe for welding steel and iron in the most perfect manner. It is in a sense the combustion of hydrogen by itself, instead of by oxygen. The last named combustion gives water; the new one gives back the molecular hydrogen.

This wonderful achievement is almost incredible, although it is done on the smallest scale, giving a flame of the order of a candle flame. Now let us go from the laboratory, where this modern miracle originated, and try to find some place where it was done previously. To get the answer to the query this suggests, we could use the old refrain—"Read the answer in the stars"—for it is there we would find it. The temperature of the stars in many cases is so enormous that atoms cannot exist in them. The disintegration of the molecule is simple in comparison to the stripping of electrons from the atom, and this is supposed to take place in the white stars, at least.

There are strange things in the stellar world. The cosmic rays, to which Millikan especially has given so much investigation, he believes are due to the building up of atoms of other elements from hydrogen. It is strange to think of the transmutation of elements going on in interstellar space, yet this is what the theory of the origin of the cosmic rays seems to lead to. But in the light of the activation of hydrogen in the electric arc, we cannot hesitate to believe that atoms exist in the white stars, whose temperature is beyond our conception, even if we do find it expressed in prosaic degrees centigrade.

Analysis means unbinding; when a chemist analyzes a compound, he unbinds it, separating its constituents one from the other. This is done in the hydrogen blowpipe, spoken of above. It is done by the application of the heat of the electric arc and also by the heat of the stars. Now let us think of a gigantic analysis where it is no longer a question of dealing with a little jet of hydrogen, but where we have a world of matter in a white star, whose whiteness is due to its intense heat, far surpassing that of the electric arc. Here we are told of the existence of atomic matter, where the molecules are not only analyzed into their constituent atoms, but even these are subject to a loss of their electrons, a step in decomposition, which is literally analysis, the star figuring as an analytical chemist. Where the chemist on our earth works with a few grains of the substance he is analyzing, the white star does its work on a truly cosmic scale. Its color tells its high temperature, as we speak of white-hot iron.

Part I

Illustrated by PAUL

The Drums of

JUST because a region is totally inaccessible to the outside world, it does not necessarily follow that the inhabitants (granted that the place is inhabited) are living in a totally savage state, absolutely devoid of the many conveniences and inventions of modern civilization. Tribes of progressive peoples have vanished—apparently from the face of the earth. What has happened to them? Where have they gone? Any number of answers might not only be possible—but might actually be true. It is hardly likely that a progressive people, no matter where, would degenerate to a savage state. Capt. Meek, our well-known author, can always be depended on for an unusual story, particularly when it is written for AMAZING STORIES *as this one was. Do not fail to read the first instalment in this issue.*

CHAPTER I

We Send for Willis

MARISTON claimed that the drumming was a delusion, merely the effects of an over-wrought imagination, but then he was a skeptic and had to say that. I believe that he changed his mind at the last, although he never admitted it. Willis said that it was black magic and the work of devils, but he had a very limited scientific education, despite his wide-spread roamings over the globe. What Nankivell thought, we never learned, but doubtless he knows all about it now, if he is still alive, and could easily explain it if one could find him to ask. Personally I believe that it was a natural phenomenon based on the laws governing some form of radio transmission that we are at present unacquainted with, but then I am only the Greek chorus that comes in at the end to explain matters and my personal opinions don't count for much. At any rate I'll tell the story and you can be your own judge. Your guess is as good as anyone's and the only way that the matter can be proved is by another trip up the *Rio Tapajos* and I wouldn't be allowed to make it, even if I wanted to.

I had a pretty comfortable little job in 1917 when the war broke out and I didn't much like the idea of giving up my start and putting on olive-drab, but my father and grandfather had worn the uniform in 1861 and 1898 so there wasn't much else for me to do. Besides, it was a case of volunteer or be drafted, so I took the bull by the horns and went to the first training camp and by virtue of some National Guard experience during my college days, I drew a commission and went down to Texas to do my bit. I didn't get over and my whole war experience consisted of an endless round of drills and the petty duties that go to make up a subaltern's job in the line. We did have a little fun down along the border for a while, but it didn't last long. If the Hindenburg line hadn't given away when it did, we might have got across for we were on the shipping list and were due to start for Hoboken soon, but it broke and 1919 found me still patroling the border hoping for a scrap that never came.

Mariston had been over with the Second Division but he had stopped a bit of high-ex shell and when he recovered, he was sent home to train some of us in combat work. He was an expert machine gunner and a mighty fine chap, except that he didn't believe in anything, not even Army Regulations.

Nankivell was a newcomer to the regiment, a washout from the Air Service. He had been a first-class pilot and if he had ever got to France, he would have been an ace, but he was held in Florida as an instructor and it soured him. He was a crazy sort of fool, seemed to love to take a chance and would bet on anything from a Presidential election to what we would have for dinner. He'd offer you a bet and then, if you didn't like the side he offered you, he'd take that side and let you have the other. I don't think that he had a care in the world or a thought for the morrow. He would have been a top-hole combat man, but as a flying instructor, he wasn't so good. His C. O. stood him as long as he could, but when he cracked up his seventh plane and killed a youngster whom he was supposed to be teaching to fly, the Old Man called him in and advised him to transfer to some other branch. It made no difference to Nankivell, so when the C. O. suggested the Infantry, he made his application, and in due time, came to us.

This gives you the cast, if we except Willis, who didn't come in until later and Pedro, who was only an Indian after all, for all that he was a brave man and a true friend. The opening scene was my tent down near El Paso where we were supposed to be guarding the border and were in reality drilling all day and playing bridge most of the night.

"WHAT are you planning to do, Duncan, when they turn you loose?" asked Mariston as the evening bridge game dragged.

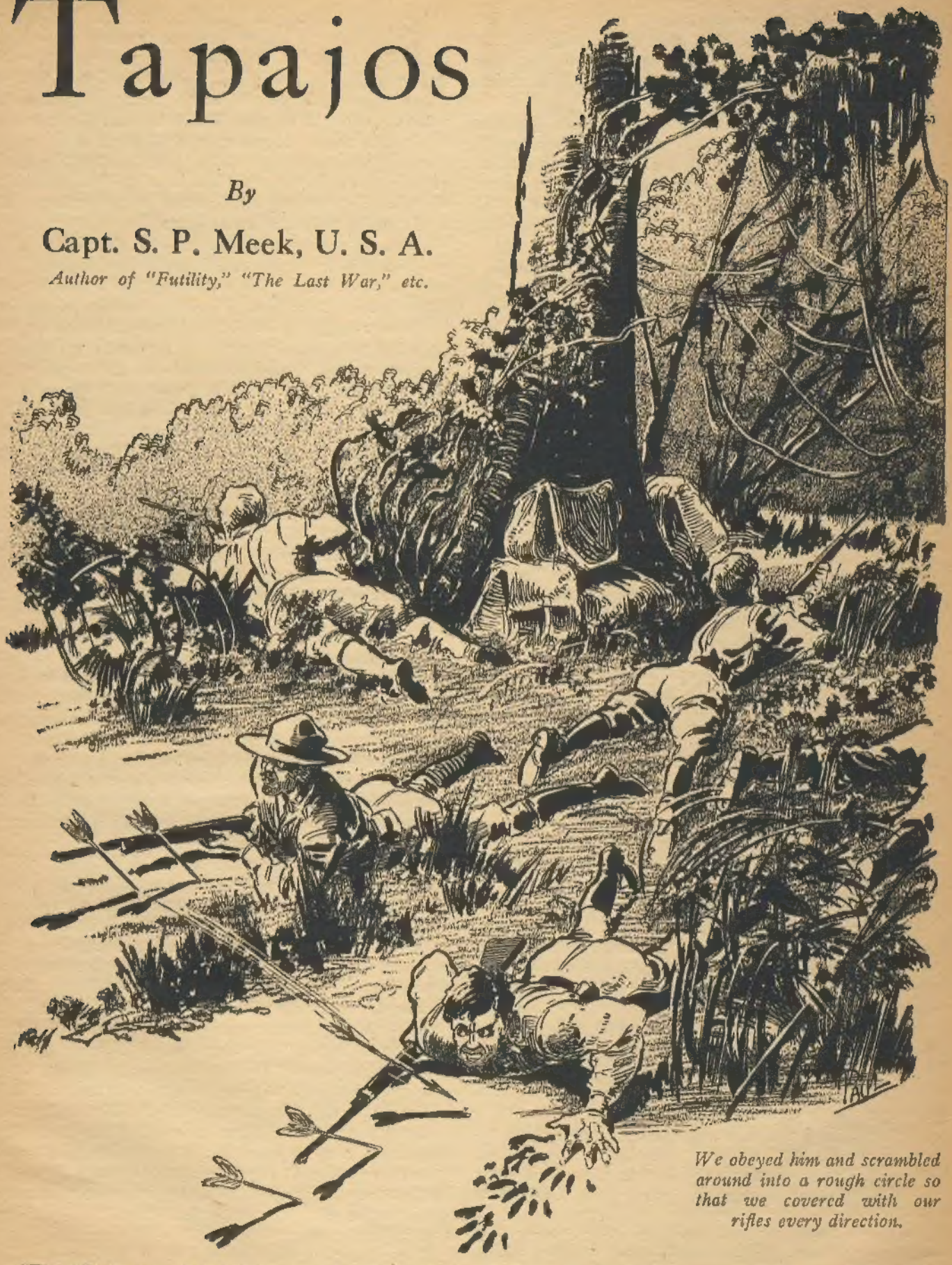
"Darned if I know," I replied. "I don't feel like going back to a laboratory again, but I don't know what else to do. I might join the Mexican army. They seem to have a little fighting now and then."

Tapajos

By

Capt. S. P. Meek, U. S. A.

Author of "Futility," "The Last War," etc.



We obeyed him and scrambled around into a rough circle so that we covered with our rifles every direction.

"They'd take you all right," laughed Morril, who was making our fourth hand. "A chap tackled me the other day about it. He offered me a commission as a Lieutenant Colonel at forty *pesos* a day and said he could use more. I'll recommend you if you want me to."

"Only Lieutenant Colonel?" asked Nankivell. "It would have to be at least a Major General's stars to attract me. From what I have seen of our friends, the spicks, a Lieutenant Colonel ranks with them about as a Corporal does with us."

"I'm afraid that wouldn't do," was my rejoinder. "There's some chance that the U. S. will have to intervene and I wouldn't like to be caught on the other side of the line when that happens. I would like some excitement, though."

"We might go down to one of the banana republics and stage a revolution," said Mariston thoughtfully. "I knew a chap that pulled that regularly and just as regularly lost his job the next month. If you can scare up a few thousands for guns and run them into any of the Central American states, you can get a following in two hours."

"Where could you get the guns?" asked Nankivell.

"Bannerman would sell them if you could raise the cash," he replied.

"Let's do it," said Nankivell, laying down his hand. "I've got the money, or can get it easily enough. Which one shall we pick on?"

"Oh, any one," said Mariston. "If you are really interested, I'll write down to Willis, the chap I spoke about and find out which one is ripest for trouble right now. If you're in earnest, dig up the price of a boat-ticket from Rio de Janeiro to New Orleans and a rail ticket here and I'll have him come up. He has had lots of experience at the game and he'll come anywhere, if you pay his way and guarantee him his expenses back again."

"Certainly I'm in earnest," said Nankivell. "We are due for a return to civil life any day now and even if we weren't, I'm tired of hanging around this place. Let's get him up and see what he can do for us. Will you go into it, Dunc?"

"I guess so," I replied. "I wouldn't mind taking a whirl at something exciting for a while before I settle down again. I'll split on the price of that ticket with you."

"Split, nothing," laughed Nankivell. "I'm the only one here who has money to throw away on this prospect, and nothing may ever come of it. If anything should, you can pay your share out of what we make."

"You fellows had better join the Mexican army," counseled Morril. "This revolution sounds nice but you are overlooking one thing."

"What's that?" asked Mariston.

"You might start your fun all right and get away with it for twenty-four hours, but about that time, the *New York Times* would run a little squib on an inside page stating that 'the Marines have landed and have the situation well in hand.'"

"Not with Willis running the show," replied Mariston. "At any rate, Frank, if you really mean business, turn me over an international money order for eight hundred tomorrow and I'll write Willis and have him come up and tell us about conditions."

"You'll have the eight hundred by ten o'clock tomorrow morning," declared Nankivell. "Meanwhile where is Dunc's typewriter? I want to write a letter to the Adjutant General resigning from this man's army."

"Don't be in too big a hurry about that," I counseled. "Willis may not come and you may find yourself on the outside with no way of getting back."

"Willis will come all right," said Mariston. "I helped him out of a little scrape down in Nicaragua some years ago and he'll come if I send for him, no matter what he has on hand."

"And what were you doing in Nicaragua?" I asked.

"I was with the United Fruit at the time. It wasn't much that I did, but Willis made a lot of fuss about it and swore eternal gratitude. I think that Frank is right about resigning, Dunc. If we are really going into this matter, we ought to meet Willis in New Orleans and work from there. It will take all of three weeks to get our resignations through and by that time he'll be there. If we aren't going into it, there is no use in sending for him at all and wasting his time and Frank's money. I'll send mine in tonight if Frank does."

I thought rapidly. When I had said that I wanted to get into a little excitement, I was really expressing a sort of vague longing for something that I meant to do some time in the future. I had had no idea of rushing into things headlong. The idea of going adventuring was attractive enough and was an idea that had engrossed my imagination ever since I had read *Captain Macklin* as a boy, but when it came down to brass tacks, it looked more pleasant as a fascinating dream than as a grim reality. I wanted to go, all right, but I also wanted to get back to my laboratory and I wanted to get back to Molly. To be sure, the laboratory would wait, but Molly might not. I decided to hedge.

"You fellows go ahead and resign," I said. "I'll have to think matters over a little more before I make up my mind which way to jump. I'll tell you in a couple of days. If I don't go, you can get along as well without me as with me, and if I do go, I'll wire my resignation in and get out as soon as you do."

"Don't come unless you feel that it's worth it," counseled Mariston. "I have knocked around Central America a little and it's no place for a man to start trouble unless he's willing to go with his life in his hands most of the time. The only way to lead a gang of spiggoty *insurrectos* is from behind with a club and you always have the cheering knowledge that any one of them would sell you out to any one who would give him four dollars Mex more than you were paying him. If you win, you get in soft for a while, but it's even money that you get a firing squad."

"Well, now that that's settled," said Nankivell, "who here knows the right way to word a resignation so that it will be accepted and not be sent back for correction?"

I thought the matter over most of the night and finally made up my mind. I would leave the matter on the knees of the Gods; in other words, I'd make my action dependent on a woman's whim. I wired Molly: "Am leaving the Army flat. Will you marry me when I get home?" Molly's answer was typical of her. "Wouldn't you like to know?" she wired back. I carefully composed another wire. "This is an important matter. Stop joking long enough to give me a straight answer. My whole future depends on your reply." The reply came in due course. "Don't be so serious and tragic. I can't help it if you are a joke. Make your pile and I'll consider your proposal. If you think that I am going to live in three rooms in Flatbush and do my own laundry, you'd better change your brand. The kind you are smoking has too much hop in it."

If she hadn't sent it collect, I might have been thinking it over yet, but that collect was the push that sent me over the line. My next telegram was to the Adjutant General and informed him that the United States Army would have to worry along without my valuable services in the future.

CHAPTER II

The Mysterious Knife

SOMEHOW I had pictured Willis to myself as an elderly man, spare and wiry, with gray hair, and I was altogether unprepared for the individual who greeted us at New Orleans. Willis was not in the least like what I had always pictured adventurers, basing my fancy on my impression of General Laguerre. To start with, Willis couldn't have been much over thirty and his hair was coal black. Far from the spare and rather small man I had pictured, he stood a good six feet three in his stockings and weighed at least two hundred and there was not an ounce of fat or surplus flesh on him. He was handsome too, in a way, and I could readily fancy him as the hero of the many amourous adventures which Mariston credited to him.

He came down the gang plank with a rush and greeted Mariston joyously.

"What ho and also which?" he cried as he grasped Mariston's outstretched hand. "So you have decided to go into the game after all, have you? Good news; couldn't be better! Where are the recruits?"

Mariston introduced us and I could feel that Willis was sizing us up thoroughly in the manner of a man who often had to decide in a moment whether to trust his life to a stranger or to shoot first and ask questions afterwards.

"Let's go up to the Grunewald," he said. "I heard that the United States had gone dry, so I brought something pretty choice along with me. It's in my grip and I'll get it as soon as I can worry it through the Customs. Have you any drag with them? No? Well, it doesn't matter, I'll manage it somehow."

He was good as his word and half an hour later we were seated in the suite that we had secured, listening to him talk.

"Did Bob Mariston ever tell you what he did for me?" he asked.

"Oh, shut up, Ray," broke in Mariston. "That's nothing to tell."

"The dickens it isn't," he replied. "It was one of the nerviest things I ever saw pulled. I was mixed up in the Valdez revolution in Nicaragua in 1911, and after we had failed to take Bluefields, the bottom fell out of things and my men deserted to Santuro's general and took me with them, a prisoner. How Bob ever found out about it I don't know, but he showed up that night with a forged order from Santuro and took me out of camp. He cut my bonds and between us we policed up the two soldiers who were supposed to be guarding me and left them tied up and traveled all night. He smuggled me aboard a United Fruit boat the next day and told the Skipper to light out for the States. Bob was Resident Manager for the United Fruit at the time and the Skipper did as he was told and asked no questions. Pretty cool deal, wasn't it, youngster?" he went on, turning to Nankivell.

"Once you were free, why didn't you try to pick up a few men and run Santuro's gang out?" Nankivell asked.

Willis laughed.

"He'll do," he said to Mariston. "In fact they'll both do. Duncan here is rather cautious, but he'll stick to the last gun or I don't know the breed. We'll have to watch the youngster though he's a little too harum-scarum. It would be just like him to spoil a perfectly good ambush just to start the fun a little sooner, but he has nerve and to spare. Now that that is settled, what are your plans?"

"You are our plans," said Mariston. "I haven't been south for several years and I am out of touch with conditions. I imagine that Nicaragua is too settled and Honduras is pretty well looted just now, but what about Salvador or Costa?"

Willis looked rather thoughtful.

"Are you really stuck on the revolution game?" he asked.

"Not if we can get something better," said Mariston.

"I'll tell you, Bob, the revolution business isn't what it used to be," said Willis. "Right now, especially, it is a rotten time to try to pull one. With the war just over, Washington has more Marines than they know what to do with and if anything cracked below Mexico, we'd have a detachment down there in no time. Besides the spiggoties are not so ready to revolute as they once were, and the Generals want too big a cut of the loot to make it very profitable for the promoter. Most of those governments have a few machine guns and trained crews now whom they pay well enough for them to support the government, and you know what a few modern machine guns mean down there. I think that I have a line on something that will beat the old graft all hollow."

"Is there a chance for some fun in it?" asked Nankivell.

"Plenty, youngster, in fact all that even you will want. Bob, were you ever in the *Cardoso* country?"

"No. That's in Brazil, isn't it?"

"Yes, in central *Para*. There is a section down there that has never been explored. It lies between the *Rio Tapajos* on the west, the *Rio Xingu* on the east and the *Rio Sao* and the *Rio Cariahy* on the south. It's an absolutely virgin wilderness of swamp and jungle, no rubber to speak of and no apparent reason exists for exploring it. That's probably why it hasn't been opened. I've heard some mighty funny stories about that section and I was at Rio trying to get someone interested in the matter when your cable came. I caught the next boat, because I figured that I owed you something, and it was my best chance to ever get square with you."

"What is it, Ray; rubber?" asked Mariston.

"No, it's a bigger game than that. Did you ever see anything like this?"

He reached into his pocket and drew forth a long slim dagger with a glittering steel blade and a handle of yellow metal which had apparently once been thickly encrusted with stones. Mariston took it and examined it with interest.

"No, I never did," he said at length and passed the knife to Nankivell.

"Grecian, isn't it?" asked Nankivell as he passed it to me.

I tested the spring of the blade and tried the handle with a pocket knife before replying.

"It's not Grecian," I said. "It looks more like Phoenician than anything else but it has a steel blade. The handle isn't gold although it looks like it. It is some yellow alloy that is harder than gold could be and still keep that color. I would say at a guess that it's about 1913 German."

"You're all wrong," said Willis. "I have had that

thing for two years now and I have had it to a dozen museum curators. The design is nearer ancient Hebrew than anything else, but it isn't quite right for that. The biggest mystery is about the blade. That blade is steel and it is rust-proof and tarnish-proof steel. It is some alloy but I haven't been able to find out what it has in it. It isn't chromium and it isn't vanadium and there isn't a chemist in the States that can identify it. It contains some element closely allied to molybdenum. Also, Duncan, you were wrong about the hilt. It *is* gold, or at least 82 per cent of it is."

"What is the balance?" I asked, "Another mystery?"

"No mystery at all. It is 3 per cent platinum, 5 per cent osmium and 10 per cent iridium. It is harder than fountain pen point alloy and valuable as the dickens."

"THAT'S all very interesting," said Nankivell, "but it isn't getting us anywhere. The point is where did you get it and what has it to do with a South American revolution?"

"It hasn't anything to do with a revolution, youngster, but it has a great deal to do with what I am talking about," replied Willis. "Two years ago, I had business up the *Rio Tapajos*. Never mind what it was, it didn't pan out, but it carried me clear up to Bacabal and I stayed there for a couple of months. The town didn't offer much in the line of amusement and besides my business lay in the interior, so I went up an unnamed stream about thirty miles above the town and camped.

"One night while I was there, there was a disturbance outside my tent and I went out to see what it was all about. Rip, my dog, was barking his fool head off and I was afraid that some of the Indians might be planning a raid. They aren't any too friendly there.

"There wasn't anything in sight, but Rip wanted me to go into the jungle, so I took my rifle and followed him a few yards, and there in the swamp I found a man. He was wasted to skin and bones by fever and was out of his head, jabbering in some dialect that I didn't know. I hauled him back to my tent and when I got him into the light, I got the surprise of my life. The man was white."

"White?" we chorused in amazement.

"White," he replied gravely, "or if not white, so near it that he would pass muster anywhere. He had the high cheek bones of an Indian and his hair was coal black, but it was curly. His nose was hooked like an eagel's beak. He was dressed in a long white robe of a peculiar pattern, something like a Japanese kimono, edged with a wide black border. I would have said that he was a Spanish Jew, but he couldn't talk a word of Spanish.

"I nursed him along for a few days and gave him some quinine and in time he came to. That was when I found out that he couldn't talk Spanish. He babbled along for a while in his dialect and I gave him some beef tea with an opiate in it and he went off to sleep. He woke a good deal stronger, but it was the final flare-up before he went out.

"He sat up in bed and started to talk. He was very grateful for the little that I had been able to do for him and he kissed my hand and stroked my head. He kept on talking but I couldn't understand a word, although his speech sounded sort of musical. Finally he leaned over the side of the bed and tried to draw on the floor with his finger. I brought him a paper and a pencil and he seemed to know what they were for all right, for he started to make a map of some sort. As nearly as I could make out, it was a map of the stream we were on and its course into the interior.

"I didn't make out at first what it was about and he reached under his robe and opened a pouch that hung to his girdle and brought out this knife and handed it to me and started his jabbering again. Now comes the funny part of the yarn. When he started to talk, we heard a drumming in the jungle."

"Tom-toms?" asked Mariston.

"No. At least, it didn't sound like it. I seemed to feel it rather than to hear it. It must have been a good many miles away but it seemed to excite the sick man a good deal. As he drew the map, the drumming grew louder and louder, but it didn't seem to come any nearer and it seemed to be inside of me rather than a sound coming from the outside. When he handed me the knife, the sound rose to a crescendo and the chap leaped out of bed, his eyes literally popping out of his head and he pointed toward the door.

"I looked and there wasn't a thing I could see, but he shrieked and began to froth at the mouth. He swayed and I jumped for him and caught him as he fell, but it was too late. He was dead. I have picked up a good deal of medicine in my knocking around and I tell you, that man died of fright."

"Are you sure it wasn't fever?" I asked.

"No, sir, it was fright and nothing else. I have never in my life seen a face that depicted such absolute fear. It haunted me for weeks. Now for the second funny thing. When he dropped dead, the drumming stopped. It stopped absolutely and the sudden silence was uncanny. It was worse than the drumming had been. My nerves are pretty good, but when Rip sat back on his haunches and howled, I knew that I had had enough. I left that tent like the Devil was after me and roused my boys and lit out for Bacabal that night.

"I tried to find out something there, but the natives wouldn't talk. One sight of that knife and they shut up like clams. I got my nerve back in a day or two and I went back to have a look in that pouch, but as I expected, the body was gone. The Indians there are head-hunters to a man and a body won't lie around long.

"I went back to Belem and dug out one of the stones from the handle and sold it and got enough to come to the States. I have tried to get some dope, but after two years of consulting with chemists and metallurgists and archeologists, I know just as much as I did at first. From time to time, I dug out the stones and sold them. They were emeralds and turquoise with a good sprinkling of rather small diamonds and I have realized eight thousand from them. The knife is worth about a thousand more. Now, here is the point. That knife came from the *Cardoso* country and where it was, there are more like it. I want to fit out an expedition and go after them. How does it sound?"

"Hot puppies!" exclaimed Nankivell, "I'm with you right now. When do we start?"

Mariston pondered the question for a few minutes before he spoke.

"Have you got that map?" he asked at length.

"No, I haven't. It disappeared from my clothes the next night. Of course I questioned my boys but they swore they hadn't seen it and as Rip hadn't raised any row, I don't think it was stolen. I must have lost it out

of my pocket somehow. It was a remarkably clear piece of map-making and I wish that we had it, but we haven't and we'll just have to go it blind. The place is somewhere in that country and I mean to go with equipment for a year and stay there until I locate it. Are you all with me?"

"What about it, Dunc?" asked Mariston. "This is a new game to me and your judgment is as good as mine. If you say go, I'll approve. If you say no, I may go anyway."

"I expect that it is as good as anything," I replied. "It can't be a lot riskier than the revolution we planned to start, and at least, we'll have some good hunting."

"That's settled then," said Mariston. "How much money do we need, Ray, and what preparations shall we make?"

Chapter III

The Tierra Prohibitiva

AT BELEM, we secured those portions of our equipment which Willis and Mariston had thought uneconomical to take from New Orleans and boarded a river steamer for Santarem. The leisurely trip up the mile-wide Amazon was a time of sheer delight for Nankivell and me. We never tired of watching the low banks, overhung with lush, tropical vegetation and speckled with scarlet, mauve, pink and white hibiscus blooms, "like confetti on a billiard table," as Nankivell inelegantly put it. The gorgeous butterflies flitted from bloom to bloom and out over the water to rest for a time on the huge waxlike lilies that floated on the stream, creating the illusion that the flowers had taken wings unto themselves and were flying out to greet us. At times the channel which we were following ran in close to the bank and we could see little marmosets and monkeys skipping through the branches and pausing to peep curiously at us through the leaves.

"Those monkeys are pretty good eating," remarked Willis one afternoon as the four of us sat idly watching the panorama spread out before us.

"Do people eat them? White people, I mean?" I questioned.

"They surely do, Dunc, and are mighty glad to get them at times. This jungle is teeming with life, but it isn't all edible or easy to get at if it is. There are lots of tapir in Para and quite a few deer, but you can hunt for days without seeing one, even when you are doing nothing but looking for them. It is the same with many of the varieties of birds, but you can almost always bag a monkey or a couple of parrots and both of them are all right for the table. The parrots are apt to be a little tough, but the monkeys are usually pretty good."

"I can't quite fancy eating a monkey," said Nankivell. "It seems too much like a form of cannibalism."

"Cannibalism isn't at all unknown in the region we are headed for," replied Willis. "As far as monkey-meat goes, I dare say that you'll eat a good many pounds of it before you see salt water again. Game is more plentiful in the *Cardoso* country than it is here, but even so, I expect that at times, we'll be thankful for the monkeys."

"Perdone, Ustedes," interrupted a tall Spanish-looking man who had been leaning on the rail listening with amused tolerance to our talk, "did I understand you to say the *Cardoso* country?"

"Si, Señor," replied Willis. "We are going up the *Rio Tapajos* to Bacabal and then do a little hunting and exploring over toward the *Rio Xingu*."

"Madre de Dios!" exclaimed the Spaniard. "You *caballeros* must be tired of life. That is the *tierra prohibitiva*."

Willis visibly pricked up his ears.

"The forbidden land?" he asked, "by whom is it forbidden and what is forbidden in it?"

"Quien sabe?" said the Spaniard with an expressive shrug of his shoulders. *"Señores,* I do not know, and yet I, Don Esteban Guzman, live on the outskirts of it at Itaituba. This, however, I do know; you will find no natives who will go with you behind Bacabal unless you are keeping to the *Rio Tapajos* and are going direct to Manoel Cardoso. Since you go toward Itaituba, we will be *camaradas* as far as my home and I entreat you to make your stay at my humble *casa* while you are there. May I inquire whom I have the honor of addressing?"

"Thank you, *Don,"* said Willis when he had made himself known and had introduced the rest of us. "We will be more than glad to accept your kindly offered hospitality. I know what passes for a *posada* in Itaituba and we will be mighty glad to escape it. Pardon my curiosity, but I am surprised to find one of evident Spanish descent here."

"Most of my neighbors are of Portuguese ancestry," replied the *Don,* "but my ancestors had settled here before the Holy Father divided the lands and gave Brazil to Portugal and here we remain going with each generation deeper and deeper into the interior."

"That is very interesting," said Willis. "But tell us more about this forbidden country."

"Señores, I do not know. There are tales and tales, but since you have been here before you know the natives. There are tales of huge beasts, more horrible than the imagination of man can picture; there are tales of a race of sorcerers and magicians; there are tales of demons and unchained devils; there are tales of swamps and jungles which no man can cross. Which of these is the truth, if any of them are, I cannot tell you. Pedro, my *mayordomo,* went into the *tierra prohibitiva* once in his youth. He came back three months later, an old man; the only one out of a party of sixteen who started. He has been in my employ for over twenty years and I know him well, but not one word of what happened to him and to the rest of the party has he ever told me. I do not love the jungle and have never tried to go in that direction. Some have, lured by the siren call of adventure, but only once in a generation. None has ever returned."

"The road to Manoel Cardoso is open, isn't it?" asked Willis.

"It is open to those who keep the main line of the *Rio Tapajos* and wander not off into the side streams. That way lies madness and death. I have heard that one man went up a stream beyond Bacabal once, some two years or more ago and he returned alive but with the face of the dead. He is said to have brought with him great treasure, but I was in Belem at the time and did not see him. I doubt the story, although my servants claim to have seen him and talked with him. His name was *Señor* King."

"King?" muttered Willis thoughtfully, "I don't believe that I ever heard of him."

"He was such a man as you are, by the description, *Señor,* but my servants said that death was written on his brow and that he could not have reached Santarem alive. The whole thing may be but a fable; at least we have never heard of him again. Come, let us go forward to the smudges. The sun will be setting soon and the mosquitos will be after us."

At Santarem, our friendship with *Don* Esteban saved us from the horrors of the local *posada* and secured us an invitation to stop at the home of the manager of a rubber plantation a few miles up the river. Mariston suggested that we try to secure servants here, but Willis negatived the idea.

"These town Indians are too civilized to be any good at jungle work," he said, "and they are apt to be more superstitious and devil-ridden than the wild product. The priests have hold of them here and have tried to teach them Christianity. The only result they have achieved has been that their converts have grafted the whole Christian theogony upon their own system of Gods and devils and have twice as many things to fear and no more to help them. We'll wait until we get to Itaituba at least and possibly Bacabal."

At length the little stern-wheel steamer groaned her way down from Itaituba and we boarded her. It was noticeable that the country was rapidly growing wilder. From Belem to Santarem, occasional villages were to be seen along the river bank and even two or three fair-sized towns, while patches of cleared or semi-cleared land were not uncommon. Around Santarem, the same was true, but beyond Aveiros, nothing much of the sort was to be seen. The few tiny hamlets along the bank were scattered long distances apart and often hours would pass without a dwelling to break the monotony of the jungle.

"Get ready to look your last on the bright lights, youngster," said Willis to Nankivell one evening. "We are due in Itaituba tomorrow and it is the last city we'll meet until we get back to it. It has all of three thousand inhabitants, if you count all the Indians, and has weekly mail service. You can send your last letters off from there and hope that they eventually get to the States, but when we leave we are on our own."

Our host's *mayordomo,* Pedro, met the steamer at the landing, backed up by an assortment of individuals of both sexes and of all colors from that of dirty parchment to mahogany brown. Apparently, Don Esteban was a man of some local prominence.

"Pedro," said the *Don,* "these *caballeros* are my guests. While they remain, they are your masters and their lightest wish is law. Their names are Señor Mariston, Señor Nankivell, Señor Duncan and Señor Willis."

Pedro babbled a string of Spanish mixed with Indian and bent low before each of us in turn. Willis was the last he saluted and when he raised his head and saw Willis' face, his own went suddenly ashen.

"*Señor Ray!*" he gasped. "You do not die?"

"Mister King?" exclaimed *Don* Esteban in surprise with a searching glance at Willis.

Willis looked puzzled for a moment and then burst into laughter.

"I beg your pardon, *Don* Esteban," he said. "I had no idea of running under a false name. My name is Ray Willis and Pedro called me Mister Ray. I forgot when you spoke of King, that *rey* is king in Spanish and that you had translated the name for our benefit."

"And you have been here before?" asked *Don* Esteban, "You are the man who has penetrated the *tierra prohibitiva* and returned to tell the tale?"

"I haven't been into it far, *Don* Esteban, but I am going in deeper with my friends on this trip. I have been up a little beyond Bacabal and into the jungle for a few miles, but nothing to speak of. It was enough to excite my curiosity however and I have decided to go into it."

"*Señor* Willis, life must be hateful to you," replied *Don* Esteban gravely. "Were I *alcalde,* it would be my duty to prevent you from going, but fortunately I am not an official and a Guzman has never betrayed his guests. To all who ask, you are going directly to Manoel Cardoso, Pedro, do you understand?"

"*Si, Señor,*" replied Pedro submissively.

TWO weeks slipped away pleasantly at *Don* Esteban's "humble" *casa,* which proved to be, in reality, a palace. The *Don* was the magnate of the town, owning all the rubber in the vicinity and most of the rest of the arable land. Much of it, he informed us, he held by virtue of a grant to one of his ancestors from the Crown of Portugal. The fact that we were his guests was sufficient to secure for us the hearty cooperation of every one in the town and proved to be almost enough to overcome the *mañana* which confronted us at every turn. It was easy to secure boats and boatmen for a trip to Manoel Cardoso and in time everything was ready for us. *Don* Esteban tried in vain to dissuade us from embarking on our adventure, but when he found it hopeless he raised his voice in our behalf and commanded that we were to be aided in every way possible.

"Your boatmen will desert you at Bacabal when they find out where you are going," he said. "I doubt if you can get any there for your trip, but I am going to send Pedro along with you that far. My name is not without influence in this country and he can speak in my name to more purpose than you can, although you, *Señor* Willis, are one of our local deities and can get men for your purpose where even I would fail. Your goods are ready and there is nothing save my wishes to delay you. Will you not give up this foolish venture?"

"Absolutely no, *Señor;* thanks just the same," answered Willis. "We hate to tear ourselves away but with your permission we will start in the morning. We will return Pedro in good condition in a few days and we thank you very much for sparing him to us."

We started at dawn the next morning. We traveled in two canoes, Willis and I in the leading one with Pedro as Captain, Mariston and Nankivell bringing up the rear in another canoe under the command of Pedro's son-in-law, Juan.

Daybreak over the Tapajos was a scene of beauty never to be forgotten. As the blue of night faded into the gray of early dawn the parrots and monkeys awoke and began their endless chatter. The grey gave way to a rosy hue and long streamers of crimson, green and scarlet waved in the sky overhead. Gradually the shore became visible and when the sun rose in a burst of golden splendor and the mosquitos departed for the day, I leaned back filled with the real joy of living.

Close under the bank we traveled to avoid the swift currents and the treacherous rapids that infested the stream. Little marmosets ran along the bank beside us, leaping from tree to tree and voicing their displeasure at

our intrusion in a series of petulant cries, which would be suddenly hushed for no apparent reason, only to break out again in a moment with renewed violence. Other forms of life were evident too. I watched with languid interest a log that came floating down stream near us. As it came nearer, I pointed it out to Willis.

"That's the kind of log that eats people," he remarked with a smile. "Watch."

He drew an automatic pistol from his pocket and took careful aim. The report scared clouds of parrots up from the jungle on the bank and the clamor of the monkeys was suddenly hushed. The log that I had been watching suddenly reared itself up and enormous jaws opened to let out a bellow that froze my marrow before the log disappeared with a swirl into the muddy water.

As the morning wore on, it became insufferably hot. One could see the vapor rising from the river and even the parrots and monkeys quieted down. At length Pedro held up his hand and gave a cry in the Indian tongue. Both canoes turned in to shore and the crews leaped out with *machetes*. Huge swaths of palm fronds were cut and thrown into the boats and we again took our course out into the river. Out from the bank we went for perhaps a hundred yards, the second canoe following us closely. Pedro scanned the water closely at the bow, while at the stern one of the paddlers poised on the edge of the boat a large rock attached to a cord. At a word from Pedro he let it drop into the river and the canoe swung down the current and came to a halt.

"Refeccion y siesta," explained Pedro.

"Couldn't we eat and sleep in more comfort on the shore?" I asked.

"The mosquitos would eat us alive," exclaimed Willis.

The leaves were thrown over an awning under which we sat and others were rigged into a shelter for the crew. The generous lunch baskets provided by *Don* Esteban were opened and their contents spread out. It was too hot to eat much and entirely too hot to sleep as I thought, but the effects of the food soon made itself felt and in a few minutes I was fast asleep. It was several hours later when I was awakened by the stirring of the crew and the anchor was retrieved and the voyage resumed. Late that evening we came to Bella Vista, where a word from Pedro secured us a grass hut for the night.

The second day was a copy of the first, except that we slept in the canoes and did not reach Saraiva, the next hamlet, until the third night. It was a lazy life and one that I thoroughly enjoyed and it was with a tinge of sorrow, and, I must confess, apprehension, that I learned on the sixth day that we would reach Bacabal that evening.

At noon we made our customary trip to shore to secure palm fronds for our noon shelter. We reached the bank and Pedro sprang ashore. As he did so, his legs were suddenly swept from under him and he fell with a piercing scream.

"Sucuru! Sucuru!" cried Juan.

Sure enough the dreaded twenty foot water snake had him. The huge black coils were rapidly fastening around his middle. I sat paralyzed while the drama played itself out. Willis sprang for shore but missed and went down into the muddy water. He floundered around and tried to gain the bank but the second canoe swung in ahead of us and Mariston and Nankivell sprang out. Nankivell had siezed a *machete* from Juan and armed only with it, leaped into the fray. He seized the cruel black head in one hand and swung viciously with his *machete*. The *sucuru* realized that this intruder spelled danger to him and with lightning quickness uncoiled from Pedro and whipped his coils about Nankivell. Mariston had grabbed a shotgun as he had jumped for shore but had been unable to fire for fear of hitting Pedro. As the snake transferred his attention to Nankivell, the shotgun roared but it inflicted only a flesh wound which served to further enrage the snake. Tighter and tighter grew the coils and Nankivell cried out in agony and smote futilely again and again with his *machete*.

"His tail!" shouted Willis from the water. "Get his tail! Bob, for God's sake, shoot his tail off!"

The words penetrated at length to Mariston's consciousness and he rushed in and placed the muzzle of his gun against the snake's tail and fired. The charge of small shot tore through the snake and it tightened with a convulsive movement. Nankivell's *machete* dropped from his nerveless fingers and Mariston seized it and with one blow severed the tail from the body. Deprived of the leverage which enabled him to use his enormous constrictive force, the *sucuru* dropped from Nankivell's body and tried to glide off into the water, but Willis had reached the bank and broke its back with a well aimed blow of a paddle.

Nankivell was unconscious and we bent over him anxiously. Willis made a hasty examination and straightened up with a relieved expression.

"No bones broken," he announced. "He has fainted from the pain, but he'll come around all right. Dunc, give me the brandy."

A few drops between his lips soon brought Nankivell around. Willis insisted that he lay quietly in the boat although Nankivell laughingly insisted that, aside from a severe pounding, he was all right. He had often been more battered after a hard football game, he insisted, but despite his protests Willis kept him on his back for the rest of the day and had him carried ashore and into our hut at Bacabal.

After supper, Pedro tapped on our hut near the doorway. He entered at Mariston's invitation and seated himself on the floor beside Nankivell.

"*Señor* Frank," he said gravely, "you are a brave man!"

"Nonsense!" said Nankivell, "I didn't show any bravery. What I did was just plain foolishness."

"It was the foolishness that heroes show," said Pedro, "and it saved my life at the risk of your own. None but a brave man would have done it."

"If I had stopped to reason all that out, it might have been a brave thing," said Nankivell, "but I didn't. I rushed in before I thought and once the brute had me, there was nothing to do but fight it out with him."

"That is very well to say, but had you not been brave you would have stopped to think and then you would not have rushed in. The brave man does not think when his servant is in danger. He acts. The life that you have saved belongs to you."

"But I didn't save your life," protested Nankivell. "It was Mariston who shot the snake and cut it in half and it was Willis who killed it. All that I did was to get myself into danger."

"You drew his attack from my worthless self to you,"

said Pedro, "and thus let me live. But for you, he would have crushed me like an eggshell. My life is yours and since you have offered your life for mine, I will pay the debt and give mine for yours. Will you and the other *Señores* not give up this foolish trip into the *tierra prohibitiva,* if I assure you that it is certain death to attempt it?"

"Of course not, Pedro," laughed Nankivell. "We didn't come all the way from the States to be scared off by fairy stories. We have started something and we'll finish it, dead or alive, no questions asked."

"*Señor* Frank," said Pedro, his face even more grave than it had been when he entered, "you will finish it dead. Since you will not otherwise be dissuaded, I must give my life for yours. I am an old man and have little time to live and it may be that the gift of my life will make the Gods lenient and they will turn your minds from this foolishness. Since you will not abandon your trip without it, I will tell you of the trip which I made into the *tierra prohibitiva,* although the telling will cost me my life."

CHAPTER IV

Pedro's Story

"*SEÑORES,* this happened many years ago, when I was a young man and strong. I was born here in Bacabal in a little hut that has long since gone. My mother lived in that hut but my father was away much of the time. Where he went and what he did, I do not know, but the villagers have told me that he was one of the wild men of the jungle, the servants of the demons who live there. At times he came to the village to see my mother and to play with me and when he came, I noticed that the other men made much respect to him. None would speak until he had spoken his say and while he was away, the hunters kept my mother supplied with the choicest food that was to be had. At length, just before I had grown to manhood, he paid us his last visit.

" 'Pedro,' he said to me, 'you are a strong youth and will make a mighty hunter some day. I go my way into the farthest jungle to the houses of stone and many who take that road return no more. If I come not again, when you are come to the age of bearing weapons, if you feel the call of the jungle in your blood, go boldly ahead into the jungle and show this token to the first one you meet and be guided by his orders as though they were mine. Keep this securely and above all, go not into the *tierra prohibitiva* without it, for without it, death will come on you suddenly and unseen. One more caution; tell no one that you have it, not even your mother. Above all, tell not the servant of the white God.'

"The next morning he went from us back into the jungle and he came to Bacabal no more. Like the child that I was, the importance of the secret and the token that I had, made me long for the respect that I knew would be mine, if the village knew that I were free to enter where they dared not go. For a time fear of my father and the gravity of his words made me keep the secret, but, as the days passed and he came no more, the temptation was too much for me to withstand and I talked of what I had. The news traveled rapidly and in time the *padre* heard of it and sent for me.

"I told him nothing and would not speak when he questioned me, but he cried out suddenly that I was possessed of a devil and had men seize and search me. They found nothing and the hut where my mother and I lived was searched also, but I had hidden the token securely and he could not find it. He allowed me to go, saying that it was only a childish boast, but unknown to me he had me watched. I went at length to the hiding place, where I had secreted it, and his spies seized me and brought me before him with the token in my hand.

"In those days, *señores,* there was no law in the land save the law of might and the law of the church. I was scourged with rods and burned with fire, but I was stubborn like my race and I would not speak. The *padre* gave up at last and had more fire brought and after sprinkling the token with holy water, he cast it on the fire and burned it, saying that it was a token of the Evil One and that to handle it were to send oneself to the fires forever.

"When I grew older, I became a boatman and the river from Santarem to Manoel Cardoso became an open book to me. In Manoel Cardoso I found that there were others who came into the village at times as my father had come into Bacabal, and to them I tried to talk of him. Either they knew him not or they feigned ignorance. None would admit that he knew of the existence of the sign that my father had given me, so it may be that it was peculiar to this section, or it may be that they lied.

"My mother outlived my father's departure but a few years, and after she died I decided to seek my father in the *tierra prohibitiva.* Had I retained the token he had given me, it would have been simple and I would not have needed aid from others, but it had gone from me and I dared not go alone without it. There are always tales along the river of the fabulous riches that await him who dares to enter and who succeeds in conquering the mysterious land to the east and many men have gone into the jungle, never to return. Then for a time none venture, but when their children grow up, they laugh and say, 'What my father failed at, I can do,' and another party disappears into the unknown east, never to return.

"It had been a full generation since the search had been attempted, and I had little trouble in securing a party of fifteen strong and brave youths who were willing to follow me into the unknown. About twenty miles from here, there is a stream that leads off to the southeast and about sixty miles farther, there is another. I knew them both well for I had passed them many times on my trips to Manoel Cardoso and it was the second of these streams which we ascended.

"The venture was doomed from the beginning. One of my comrades was taken by the dreaded *sucuru* before we left the *Rio Tapajos* and another was taken by the fever and died as we turned our canoes east. The mosquitos were terrible in the smaller stream up which we went and the shoal water threatened to overturn us hourly. When we leaped over to push the canoe ahead, the stingrays would gash our limbs and the hungry *piranha* fish would bite pieces from our bodies. We were not of faint hearts and for fifteen days we pressed forward without seeing or hearing a soul. No game could we find, even the parrots and monkeys seemed to have deserted the jungle and our stock of *zarque* and *guarana* was nearly gone. My comrades murmured and would have turned back, but I shamed them into going on. Would that I had yielded to their desires.

"On the seventeenth day, the men of the forbidden

ground attacked us. We were pressing ahead in our canoes when suddenly the air was filled with the sound of devil-drumming. From all sides it came and it pounded into our brains like a thing alive. No, *señores*, it was not the sound of tom-toms. I have beaten the tom-tom and hunted for heads in my day and I will swear that this was not the sound we heard. It was the sound of such drums as the devils beat in their mad torture dances when they have a human being in their power. Paralyzed with fear, we sat motionless and there came to my ears a sound of dread that I knew well, the keen *whish* that is the sound of the flying arrow. I ducked my head, but it was not at me that the shaft of death was aimed. The man ahead of me gasped as the shaft flew past him, barely scratching his arm.

"The wound was slight but we, who were jungle bred and who knew the deadly poison that those shafts carry, knew that he was doomed. We said farewell to him sadly and in a moment the poison worked its end and with a shriek he threw himself overboard. It was a deep stretch of the river and only a swirling eddy showed where he had fallen. He never came to the surface.

"Again the others wanted to turn back, but I spurred them on. We turned out to the opposite bank so that we would be out of range of the arrows and went forward. The drumming came again and it was more ominous and threatening than it had been before. We bent to our paddles and drove forward at our best speed, hoping to outrun it. Again the drumming rose to a higher note and again came that fatal *whish* and our number was one less than it had been.

"Then, *señores*, came a voice. It was not a shout from the bank, but it was a low voice speaking, as it seemed, beside us. 'Oh, foolish men!' it said, 'You have dared the unknown to seek for treasure. Yet because of your bravery, treasure will be yours, the greatest treasure that man can win, swift and merciful death. Only two of you will ever live to see the broad surface of the Tapajos again and only one will reach his home. Turn back if you will, but it will not avail you. Your doom has been spoken.'

"WITH howls of fear we turned our canoes down stream and fled; but in vain. The voice had spoken truth. One by one my comrades met death, sudden and merciful as the voice had foretold. For some it was the flight of an arrow, for others the pull of a whirlpool, for others the stroke of a snake, but one by one they went until there were but two left, myself and another, José. With awe-stricken faces we continued on that way of death until we knew that we were almost within sight of the river. Then came the voice again.

"'Direct your canoe to the bank. There leave your weapons and go forward, looking neither to the right nor the left until you are stopped.' We feared to obey but we feared more to disobey and we did as we were told. Forward through the jungle we went, looking neither to the right nor to the left, as we had been ordered. At length we came to a wall of *lianas* which stopped us and we stood there in fear, awaiting what might befall us.

"For a time we waited and then a voice spoke from behind us and told us to turn. *Señores*, I am jungle bred and no man could have moved behind me but I would have heard him, yet there stood a man or maybe it was a jungle demon arrayed as a man. His face was white but his hair was as black as mine and it curled. His nose was hooked like the beak of the vulture and there was cruelty and knowledge, yes, wisdom unutterable, in those cold gray eyes and the thin-lipped mouth. This demon looked at us and it seemed that my innermost thoughts were bare before him. At length he spoke in our own tongue.

"'Of all who have dared to seek the ways that are hidden and to tread the road which is forbidden to all save those who bear the token, only you two have been spared. You, Pedro, I have spared for the loyal service which your father rendered for many years, despite the indiscretion which made you lose the token of safety which he gave to you. You, José, I have spared for the service which your father's father's father rendered to me in his day. Both of you are free to depart, but what you have seen and what you have heard it is not lawful to speak of. So long as your minds rule your tongues you are safe, yet it is known to me, through my arts, that one of you will fail ere you reach your home. Harken now to my orders. Speak not of what you have seen nor of what you have heard even to yourselves or to each other, for to me a thought is as clear as the loudest shout. Now, go in peace!'

"We turned and fled to our canoe. We paddled like mad and when we had turned a bend in the stream the *Rio Tapajos* lay open before us. Toward home we sped with all our strength and ere nightfall we had covered many miles toward Bacabal. The words of the wizard had sealed my tongue, as I had thought then, forever, but José was a boastful man and a great talker and as we sat in our canoe he spoke of that which we had seen.

"'Do you believe that the great wizard spoke the truth when he said that our thoughts were open to him?' he asked me. Fear froze my tongue and I answered naught. Well it was for me that I did not, for hardly had he spoken than the air was filled with the sound of the devil drums. Louder and louder they came and suddenly José screamed and pointed before him. I could see nothing, but he fought and struck at something in the air before him. Backward he was pressed to the edge of the canoe and with a final scream of agony, he went overboard and disappeared in the swirling water. There are many things in the river that will take the incautious bather and it was no wonder to me that I saw him no more.

"*Señores*, all through the night I paddled and so great was my strength that I reached Bacabal the next day. Many questioned me, but I would not speak and would not permit myself to even think of what I had seen and heard. I went on to Itaituba and took service with my lord, *Don* Esteban, and until this day, I have never spoken of that trip. My life belongs to you, *Señor* Frank, and although I know that the doom the wizard foretold will fall on me as it fell on José, I have spoken. You will heed my words and not go?"

"It's a rum story," said Nankivell, "but it makes me all the more anxious to go ahead. Your white wizard may be proof against native weapons, but I have an idea that old buddy Springfield will let daylight through him if he starts anything with us. Yes, Pedro, I for one am going through with it."

"So am I," said Mariston, and Willis and I nodded assent.

"If you go, *Señor* Frank, I go with you," said Pedro. "My life is forfeit already and the gods may grant that in dying I may pay my debt."

"Fine business," spoke up Willis. "Now let's check up and see just what we have found out. In the first place, it's a hard country to go into. We knew that before. In the second place, there are bad Indians there. We knew that also. In the third place, there seems to be some controlling head who is white, unless he was the man who died in my tent two years ago, which is not unlikely. In the fourth place, there is some kind of a token that would take us in in safety if we could get a hold of it, and finally, we have secured a guide who has been in for quite a distance. Things are looking better. Pedro, what did that token look like?"

"It was a piece of wood, *Señor,* with some strange marks on it, like those at which the *padre* looks when he speaks from the great book."

"That don't help much," said Mariston thoughtfully. "There may be another one somewhere, but we could never find it. Pedro would know of it if it was where we could lay hands on it. I guess we'll have to go it blind."

"Blind is right," said Willis. "I wish we had the token, but we will have to go without it. We have one token, however, that may help us along the road peacefully if they only understand it."

"What's that?" I asked.

"A battery of four Springfield rifles," he replied grimly.

CHAPTER V

The Gateway of the Unknown

DON ESTEBAN had been right when he had said that it would be a difficult matter for us to obtain boatmen at Bacabal. So long as the natives thought that there was merely a trip to Manoel Cardoso in the wind there were volunteers in plenty, but as soon as the word got out that we were headed for the dreaded *tierra prohibitiva* the ranks of the applicants thinned marvelously. Even the name of *Don* Esteban, which was freely used by both Willis and Pedro, had little effect. Pedro then let it be known that both he and Willis had made the trip before, and he minimized the danger of the trip and derided the tales of the unknown east as the fancies of old women and as things not worth the consideration of a strong man. This sort of talk finally had the desired effect and we obtained three recruits. Carlos, the youngest, was a quarterbred *mestiso* with all the volubility and braggadocio of his Spanish ancestor. Oton and Diego were fullblooded Indians. The former we were especially glad to get, for we were told that he was the grandson of one of the Indians of the same tribe as Pedro's father.

We tried to secure two more, for our canoes were large and could not be easily handled by a crew of less than five, four paddlers and a steersman, but since no more were forthcoming we decided to make out as best we could and made ready to start. Willis and Pedro consulted at length and compared notes, in order to decide which of the two main streams into the interior we should take.

By taking the farther one we would have the advantage of Pedro's guidance, but as it had been some twenty years since he had been into the interior, it was likely that his memory would not be sufficiently exact to be of much value. The other stream was known to Willis for a few miles, but his knowledge was not extensive enough to warrant having much more dependence placed on it than could be placed on Pedro's more ancient but more extensive exploration. Willis settled the argument in a characteristic manner.

"All that Pedro can tell us is of danger and sudden death," he said. "I can take you lots of places where we will find that. On the other hand, the nearer stream did yield some treasure, and treasure is what we are after. The white man, that Pedro saw, may or may not have been the one who died in my tent, but if he was, it is merely a sign that both streams are actively patrolled by the Indians and that one is no better than the other. There is another thing to consider. When my man drew his map, he drew it of the stream that we were on and he indicated a practicable, even if difficult, road to the place where we want to go. We'll take the nearer stream and hope for the best. Another reason for taking the nearer stream is that I don't trust Carlos' bravery any too much, and if it gets too long a trip on the *Rio Tapajos* it may evaporate before we turn east and we need him on a paddle. One of our canoes will carry seven at a pinch but it wouldn't leave enough room for equipment. Are the canoes all packed, Frank?"

"All set to travel," replied Nankivell. "How are we going to split up and when shall we start?"

"I'll go in the first canoe with Oton and Carlos and I'll take Dunc along to keep Carlos from talking too much. Pedro will go in the second canoe with you and Marison and Diego. Bob will be in command of it, but Pedro will have a voice in any council of war that is called. He is a very level-headed fellow and his judgment of the wild Indians is worth a great deal. I'd like to have him with me, but he wouldn't stand for being separated from Frank, and in fact it is better to have one of the previous explorers in each boat. It'll tend to steady the new men. Since we are all ready to start we might as well pull out in the morning. Frank, you're sure that you have plenty of *guarana?*"

"That and *zarque* both," he replied.

"*Zarque* is all right, but most of the time we can probably get fresh meat, but we can't get *guarana* in the jungle and it is the best bet."

"Just what is it?" I asked.

"It's a dried fruit. When you are out of everything else, you can make a drink out of it that will keep you going for days with practically nothing else. It is light and compact and it carries more safety per pound for a man in the jungles than anything else. Well, we had better turn in now, for we will want to get going at least an hour before daylight if we are going to make our camp off the Tapajos tomorrow night. It is nearly thirty miles to the point where we turn east and there is one nasty rapid in the way."

The wisdom of the paddling lesson which Willis had insisted that we all take during our stay at Itaituba and Bacabal was very evident the next day. It was true that we had traveled from Itaituba to Bacabal by canoe, but there is a big difference between lying at full length on cushions while a well-trained crew drives the craft forward and straining at an unwieldy paddle in a canoe built for one more paddler than is in it. Despite our best efforts, when night fell we were several miles short of our proposed camping place. When darkness fell we gave it up and anchored our boats well out from shore and turned in. I would have sworn that I was entirely

too tired to sleep, but despite our cramped quarters I soon fell into a dreamless slumber that lasted until Willis roused me an hour before daybreak.

"What are we going to do, Bob?" called Willis across the water. "Dunc says he is entirely too sore to paddle today."

"Well, he's got nothing on me if he is," came back in Nankivell's voice. "Every time I move an arm I want to yell 'ouch.'"

Willis' hearty laugh boomed out.

"I'm not any too spry myself, if the truth has to be told," he said. "We'll have to go at it easy and rest often for the first hour or so. It's not going to do us any good to get all stove up right at the start. I didn't say anything yesterday, for I knew that it wouldn't do any good. Break away and pull easy for half an hour until you are warmed up and then it will come a good deal easier.

The morning was a repetition of the preceding day. We pulled until eleven o'clock, took a *siesta* until three and then started again. The rapids that Willis had mentioned delayed us rather more than we had anticipated, and it was nearly nightfall when Oton pointed to a break in the green on the left-hand bank and said something to Willis.

"There she is, Dunc," said Willis to me. "There is the gateway of the unknown. We can get in all right, but the Lord only knows how many of us will get out."

With a sweep of his paddle he turned the canoe's head to the left and we entered the small stream. For a few minutes the broad sweep of the Tapajos was visible behind us and then a turn in the stream hid it from view. Willis ordered us to halt and waved to the second canoe to come up alongside us.

"Listen here, you men," he said to the native boatmen, "here is where we leave the *Rio Tapajos* behind us and go ahead to God knows what. Some of us are pretty sure not to come back again; maybe none of us will. I don't want to take anyone with us against his will, and if you want to pull out for home, you are welcome to take one of the boats and go. If you decide to stick, you are enlisting for the duration of the war, and I'll shoot any one of you who tries to bolt later. Make up your minds what you want to do before you speak, for we'll stand no foolishness later."

"Me, Carlos, I go," spoke up Carlos promptly.

"I go with *Señor* Frank," said Pedro simply.

Oton and Diego consulted together in the Indian tongue.

"We go on," said the former at last. "We trust our Good Spirit to protect us."

"Good," replied Willis. "To show you that we believe you and trust you, we are going to give you guns. Bob, break open that box of Winchesters and give them each one and a belt of ammunition. Give Pedro an automatic, too; he knows how to use it. The others are safer without them. Now, fellows, watch your step. We are in a bad country. The Indians here are head-hunters to a man and most of them are cannibals to boot. They use devilish poisoned arrows, a scratch from which means sudden and unpleasant death. Keep your eyes open and don't start hostilities, but if they are started, shoot and shoot quick. Keep your rifles within easy reach all the time and sleep with your belts on. Right here the stream is wide enough for us to anchor out of arrow-shot from either shore and no Indian will venture to swim it, but it will get narrower soon and then we'll be up against it. Now let's have a bite and turn in. We won't set a watch tonight, but beginning tomorrow some one will have to be awake all the time."

THE trip up the *Rio Willis*, as Nankivell dubbed it, soon developed into a veritable nightmare. The stream soon narrowed, as Willis had predicted it would, and the current grew swifter and harder to paddle against. This phase passed and the stream widened again and the current grew slower, but the shallows were more numerous and frequently the channel was almost choked with lilies and paddling was out of the question. For hours we were forced to pole our way up, and back-breaking work it was, in the steaming heat of the tropical jungle. When night came we would be almost too exhausted to move, and yet one of us had to be awake for one-quarter of the night. I believe that it was harder to sit under the mosquito bar smoking and trying to keep from dropping off to sleep lulled by the continuous hum of mosquitoes, than to pole the boat by day.

Sixteen days passed in this manner and so far no sign of hostile Indians, or, indeed, of any other kind, had become visible. Oton and Diego took their share of the labor uncomplainingly and, indeed, volunteered to stand their share of the night watching, but this Willis would not allow, and Mariston backed him up in his decision.

"I'd trust Pedro," he said, "but not the others. Oton and Diego might possibly be all right, but Carlos is playing the baby every time we hit a bit of hard going and he wouldn't be worth a dime as a sentinel. We'll stand that part of the grief ourselves."

It was on the night of the sixteenth day after leaving the Tapajos that we had our first unusual experience. My turn at guard was from nine-fifteen until eleven-thirty. Willis had had the first shift and he had reported that everything was quiet when he woke me. It seemed to be unusually hard to keep awake that night. The hum of the mosquitoes was monotonous and soothing and several times I caught myself drowsing off. Each time I caught myself up with a start and smoked furiously for a few minutes, but the effect of the treatment would pass and I would catch myself dropping off again.

Suddenly I sat bolt upright, the chills running up and down my back and my hair trying to stand on end. I listened intently, but not a sound disturbed the night. I am not ordinarily given to nerves but I was simply stiff with terror. I felt, or seemed to feel, eyes fastened on me, boring their way into my inmost thoughts. Carefully I scanned the water but nothing was visible. I glanced at my wrist watch and then my hair rose in real earnest. The radium dial was glowing with a positive flame, streamers of radiance leaping from it a full inch into the air. As I observed it my scientific training came to my aid and the superstitious terrors vanished. Gently I awakened Willis.

He sprang into instant wakefulness as my hand fell on his shoulder and he raised his rifle as he sat up. He peered carefully into the darkness and then moved silently over and placed his ear questioningly against my lips. I shook my head and showed him the watch. His gasp was plainly audible and I saw Pedro's form rise in the darkness, rifle in hand.

"What is it?" whispered Willis.

"Ultraviolet light from somewhere," I replied in an undertone. "I felt the rays on my skin but I didn't know what it was until I noticed the watch. It's a purely natural thing except for the fact that there is no source of ultraviolet light except the sun, which is down, and electricity, which isn't to be expected around here. We might be in the neighborhood of some large and intensely active radioactive deposit and the breeze has carried the emanation to us. It would have somewhat the same effect."

"It's uncanny whatever it is," he muttered. "Had we better wake the others?"

"There is no reason to wake them that I can see," I answered. "Whatever it is, it is nothing that has any bearing on our safety so far as my knowledge goes. I woke you just because it is an unusual and interesting phenomenon and one that I thought you would want to see."

"I've seen enough," he said, "to keep me from sleeping for the rest of the night. If you can sleep, go ahead and do it; I'll stand the balance of your watch. I'm willing to face Indians or anything else that I can understand, but when a watch starts acting up like that, I'm scared, and I'm perfectly willing to admit it."

"What's the trouble, Ray?" came Mariston's voice.

"Look at your watch, Bob," he answered.

"Peculiar," remarked Mariston. "Do you know what is causing it?"

"Dunc says it's some sort of a radium deposit that the wind is bringing to us. I never saw anything like it before."

"I have seen something of the sort in France," replied Mariston, "when I was in command of the guard detachment around an experimental Signal Corps laboratory. They were trying some sort of a silent electrical discharge for radio transmission, and it made all the watches and compasses in the neighborhood act up just the same way."

"There can't be anything of that sort here," I answered. "Ultraviolet light will do the same thing, but that's as much out of the question as high tension electrical discharges. I still think that it must be some radioactive mineral."

I studied the dial again and suddenly without warning *the phenomenon ceased*. I gave an exclamation of surprise and showed the watch to Willis.

"That's a funny thing," I said. "I was watching it when it stopped and the unusual radiance went out like a light bulb when the current is turned off. If it was radium emanation in the air that was causing it, it should have died out slowly. What the devil could it have been?"

"I don't know," replied Mariston, "but at any rate it has stopped and you had better get to sleep if you are going to be any good tomorrow. It's about time for my relief, so you turn in, Dunc. I'll call you if it starts up again."

CHAPTER VI

The Drums of Tapajos

WHEN Nankivell aroused us the next morning my first glance was naturally at my watch. It was behaving quite normally, giving only a barely distinguishable glow in the intense darkness that preceded the tropical dawn. I called over to Mariston and he confirmed my observations. We discussed the matter at considerable length, but nothing was brought out that differed from what we had all observed the night before. We gave the problem up at length and started our day's grind up the stream.

The going had been getting steadily harder for several days and it reached a climax that morning. The stream had spread out for an interminable distance on either side and, try as we would, we could find no channel that held more than a few inches of water. We would attempt what looked like a deep channel and go ahead for perhaps a quarter of a mile and then we would ground on soft mud and have to pole our way laboriously back. We tried getting overboard to lighten the canoe, but there was apparently no bottom to the treacherous mud, while the leeches were so bad that it was evident that an hour in the infected water would lay one of us ont. Channel after channel we tried without success, but at last our perseverance was rewarded. We started out on a path through the lilies that looked no different from a dozen others that we had tried, but for an hour we forged ahead.

"This channel is taking us rather too close to the bank for my peace of mind," remarked Willis.

"The closer the better," I replied. "I haven't been out of this boat for over twenty-four hours and I'll welcome a chance to stretch my legs."

"Maybe so, but all the same I'd feel better out of arrow-shot from shore," he said. "That business about the watches last night has got me worried. There may be Indians around here after all."

"Yes, I expect so," I laughed. "Indians with high tension electrical apparatus capable of affecting a watch dial at a distance of two miles.

"I don't know," he answered doggedly, "when you have lived under the equator as long as I have, you'll be ready to believe almost anything. I've heard some pretty queer stories about the magicians and wizards that live in this country and I wouldn't be surprised at much of anything."

The bank which we were approaching was apparently solid ground, quite different from the muck of swamp which had surrounded us for the preceding two days. It looked quite soft but firm enough to bear our weight without our sinking knee deep in mud and we headed for it. We were almost to the shore when we suddenly stopped paddling and sat frozen to our seats in terror. From the shore ahead of us came a cry that was a scream and yet not a scream. It started on a low note, but rose rapidly to a shrill shriek and suddenly ended in a bubbling grunt as though the throat of the screamer had been cut while the note was at its highest pitch. For a moment none of us spoke. Nankivell recovered first.

"Sounded like he broke a blood vessel on that yell," he remarked lightly. "I hope so, at any rate. It'll save me the trouble of giving him some voice culture."

"What was it?" I asked.

"I don't know," replied Willis. "Maybe the Indians can tell us."

Pedro and the others professed ignorance of the author of the cry, but I thought that they were lying. They looked too scared and I rather suspected that they had an idea.

"It was probably a bird," went on Willis. "The

smallest birds here usually have the worst voices. Did you recognize it, Bob?"

"I never heard anything like it," Mariston replied, "but I fancy that it was a monkey caught by a snake. They sometimes give off queer noises when something like that happens."

"At any rate, I'm going to go ashore and investigate," announced Nankivell.

"Better not, Frank," I counseled. "It might be something dangerous."

"There couldn't be any greater danger to me than having to listen to that voice again," he replied. "Regardless of what it is, we might as well go on and see what there is to it. If we are going to get scared every time we hear a strange noise, we might as well quit and go home."

"You're right there, youngster," said Willis. "The only thing to do is to go ahead and find out what it was. You and I will go while the rest cover our retreat with the rifles if it should turn out to be necessary. Come on, let me go a few feet ahead and keep your rifle ready."

The pair disappeared into the jungle and were gone for about ten minutes. We had just begun to get uneasy when Nankivell reappeared on the bank in a state of great excitement.

"Come along, Dunc," he cried, "and you too, Bob. There's something in here that beats everything that I have ever seen and Willis wants your advice."

Mariston and I hurried ashore to him.

"Go ahead as quietly as you can," he said. "Follow me and keep your guns ready. We don't know just what we are going into."

We followed him for about two hundred yards inland and found Willis standing on the banks of a pool of stagnant water. Silently he pointed to the ground before him. There was a footprint, so fresh that the water was still oozing into it. It was such a footprint as I had seen many a time in fossil rocks but had never dreamed of seeing fresh. It was fully two feet long and in shape resembled the footprint of a giant frog with three distinct huge claws in front. Judging from the depth of the impression, the animal who made it must have weighed at least a ton.

"Did you ever see anything like that, Bob?" asked Willis.

Mariston whistled softly through his teeth.

"Not fresh," he replied. "I saw some rather like it in Surinam once, but they were a little smaller and several days old. Have you ever run into them?"

"Once," said Willis. "That was up the *Rio Sao Manoel ou das Tres Barras* beyond Manoel Cardoso. My guide showed them to me and told me that they were made by the *Guardian of the Jungle*. I tried to pump him but that was all that I could get out of him. He told me that no one had ever seen the *Guardian* and lived to tell of it. What do you make of it, Dunc?"

"I have seen very similar tracks in fossil rocks of the later Jurassic period," I replied, "but they were larger and the claws were less firmly marked. If it weren't impossible I would say that it belonged to one of the lesser carnivorous dinosaurs, but they are extinct long ago."

"I'm not so sure of that," said Mariston. "I've seen and heard some darned funny things in the tropical jungles. How do you know that they are extinct?"

"At least they have never been seen or reported," I replied.

"They have been reported a dozen times or more," said Willis, "but since no sample was forthcoming your scientific men laughed at the reports. If you don't believe me, just try to convince a college professor of what we have seen today, when you get back. At any rate, I think the best thing for us to do is to take to the boats and go on. From the looks of his footprints that baby wouldn't be a pleasant customer to tackle."

"Let's look around a bit and see if we can't locate him," objected Nankivell. "I'd like to get a shot at him. You promised us some shooting, and the biggest thing I have shot since I have been on this trip has been a ring-tailed monkey."

"I'm afraid that your Springfield wouldn't quite be equal to that fellow, Frank," I said. "By all that we are able to tell from reconstructions that have been made, their nervous organization must have been of quite a low order, and it would take more than a hundred and fifty grain jacketed bullet to make him know that he'd been hit. We had better get on while we can."

We made our way back to the canoes in a chastened frame of mind and started on. Our luck in finding a channel had deserted us, for the line we had been following came to a dead stop in shallow water within a mile. Again and again we tried what looked like an opening, only to be stopped by shoals and mud.

"It looks like we were at the end of our boat trip," said Mariston at length.

"I'm afraid so," replied Willis. "I have been rather expecting this for the last two days as the stream got shallower and more spread out. We are fortunate in having firm ground ahead of us and we had better try it. I hate to leave the boats for we can't carry much on our backs, but I believe it's the best thing that we can do."

"We might go back a way and try another route," I suggested.

"I don't think that it would be of much use, Dunc," he answered. "I know these rivers pretty well, and when they start to play out like this they are about done. We might worry ahead for a few more miles, but when we were stopped again we might not find hard ground ahead of us. The best thing for us to do is to take this high stretch and try to follow it. Let's eat a bite and turn in for a *siesta*. This evening we can make up our packs and tomorrow we'll be all ready to start out."

I WAS dog-tired when I lay down after our lunch, which we washed down with chlorinated water, but I couldn't get to sleep. The events of the night before, and especially that blood-curdling yell and the tracks which we had seen, preyed on my mind and effectually prevented sleep from coming. In the bow of our canoe I saw Pedro busily engaged in telling his beads while Willis sat on guard. Suddenly Pedro dropped his beads and turned an ashen face toward Willis.

"*Señor* Ray," he gasped, "you hear? The drums! *Madre de Dios*, the drums!"

I strained my ears. For a moment I could hear nothing and then I felt, rather than heard, a vibration in the air. Slight as it was, it served to disturb the occupants of the other boat, and I saw Mariston rouse himself and sit up, rifle in hand. From an immense distance it

must have come and yet it seemed to be sounding beside me, or rather from inside me. It was not ordinary drumming, nor even the throb of tom-toms such as I had heard at Bacabal. It was different. Pedro's description sprang into my mind: "It was the sound of such drums as the devils beat when they have a human in their power." I glanced at Willis and saw beads of sweat standing out on his forehead like jewels.

"The drums, by God!" he exclaimed hoarsely. "They are just as I heard them two years ago. What are they, Dunc?"

"It's a new one on me," I replied. "It might be some sort of atmospheric disturbance, but then——"

"Atmospheric tommyrot," cried Nankivell, "it's Indians coming. Get your guns ready, boys. Keep your powder dry and don't shoot until you see the whites of their eyes."

"Shut up, Frank," said Mariston shortly. "All you fellows, above all, don't shoot at anything until Ray or I give the word. We are within easy arrow shot of the bank and we don't want to start anything that we can't finish. Ray, is it tom-toms?"

"No, *Señor,*" interrupted Pedro, "it is the drums, the drums of Tapajos. For years I have known that some day I must hear them again. My life is forfeit to the great wizard for I spoke when his commands were silence. Ah, *Señor* Frank, why did you not listen to me?"

The drums were getting steadily more pronounced but not apparently much louder. It is hard for me to explain to anyone just how they sounded, but it was not like a common noise. Rather it was a vibration that hammered on the tympanum of the ear with vicious force, the blows getting harder and harder with each stroke, although no real noise could be heard. Stopping the ears served merely to intensify it as I soon found out. Willis raised his head and spoke slowly and deliberately with an effort.

"Listen to me, everybody. I have heard this before and so has Pedro, and so far it has always heralded sudden death. Maybe it is sounding now for one of us and maybe it is for all of us. At any rate, not a man must fire until either Bob or I give the word. We can see nothing to shoot at and a shot may draw an attack that will pass us by if we are passive. Remember, as you value your lives, don't shoot!"

Stronger and stronger grew the blows on my ear drums until it seemed that I must scream with agony. Suddenly the pounding rose to a crescendo and then came a gentle whisper of outside sound. It was the first time that I had heard that *whish,* but I instinctively ducked and glanced around. A brightly feathered arrow struck the water with a plop some distance from us.

"Don't shoot," shouted Willis, "that was never meant to hit, it was sent as a warning. Lower your guns. Carlos! DROP THAT GUN!"

He lunged at Carlos but he was too late. Our braggadocio hero's nerves had given way and with a cry he raised his Winchester and fired twice into the jungle before Willis could wrest the weapon from him at imminent risk of upsetting the canoe and precipitating us all into the water. Willis drew back with the gun and Carlos straightened up in the bow. Again came that keen whisper of sound and a faint red streak appeared on Carlos' cheek. He raised his hand to the cut and stared as though hypnotized at the blood. Pedro crossed himself and muttered rapidly.

Carlos stared at the blood for a moment and then his limbs began a curious twitching as though he had suddenly been connected with the poles of a galvanic battery. More and more pronounced grew the twitching until froth broke from his lips and his face drew up in a horrible grimace of pain. Backward he bent as though a bow-string were fastened to his head and feet and into the muddy water he went. The mud was viscous and deep and only a trail of bubbles came up to show us where our boatman was buried. As he struck the water the drumming ceased.

I looked around. Pedro, on his knees, was telling his beads with feverish rapidity. Willis was staring at the spot where Carlos had disappeared, an expression of horror frozen on his face. Diego and Oton were cowering in the bottom of the canoe, their faces buried in their hands. Mariston and Nankivell were alert and rifle in hand, were eagerly scanning the jungle from whence had come the deadly arrow. I reached over and touched Willis on the shoulder.

"Don't shoot," he cried as he saw the threatening attitude of Mariston and Nankivell. "That first arrow was never intended to hit and the second was aimed at Carlos in retaliation for the shots he fired. Back water and let's get out of range and talk this over."

We forced the canoes over the mud until we were out of arrow range from shore and then held a council of war.

"I brought you fellows into this," said Willis, "and now it's up to you to decide whether you have had enough or not. We have met the Indians and they are as bad as I expected they would be, but we will probably be able to fight our way through them, if they are just ordinary Indians. I am free to confess that that devil-drumming, coupled with the way our watches acted up last night, has broken my nerve. I'll go ahead if you say so, because I am not given to backing out of anything I start, but my advice is to light out for home and do it quick. There is more here than I feel able to fight against."

"That drumming was a little uncanny," replied Mariston, "but there is nothing supernatural about it. It is just some kind of a trick of throwing sound that these Indians have learned, and I, for one, refuse to be frightened by it. Duncan here can probably explain it without any trouble if you give him time to think it over. My vote is to go ahead."

"I *am* going ahead," said Nankivell positively. "No bunch of Indians or any other sort of people can drum me out of town. Since they shot Carlos, to my mind it's open war and I mean to make it a war of extermination. The rest of you can do as you please. I'm going on."

"Of course, if you go, I'll go, Frank," said Mariston.

"I'll stick with you, of course," said Willis, "but I'll tell you right now that I expect to have my head dried in a grass hut before I am many days older. That needn't stop you from going back if you want to, Dunc. We are going to have to leave the boats anyway, and you can have one if you want it."

"Don't talk nonsense," I said abruptly. Frankly I wanted to turn back, and I would have cast my vote for a precipitate retreat had I been given the opportunity, but I didn't get it, and so I figured that I might

as well act as though I wanted to go. "Of course I'm going with you, but what about the boatmen?"

"I go with *Señor* Frank until I pay my debt," said Pedro quietly.

Diego and Oton spoke together in their own tongue and the former answered for both of them.

"*Señor* Ray, you bear a charmed life. So does Pedro and so may the white *Señores,* but Oton and I do not. So long as you stay on the river, we go with you, but when you go into the jungle, if you allow, we return."

"From what Pedro told me of his last trip here you haven't much chance of seeing Bacabal again," replied Willis. "If you want to go and try to make it back, my blessing on you. Once we leave the canoes your services are not needed. Even if we were going on in them, since Carlos is gone, one canoe would hold with comfort the five of us who would be left. We'll make up our packs and leave a little stuff in one canoe and you can load the rest into the other canoe and start west with it. If you get to Itaituba alive deliver the stuff to *Don* Esteban Guzman and tell him where you left us and what we are going to do."

"All right, now that that's settled, let's start making up our packs and getting ready to go to war," said Nankivell cheerfully.

CHAPTER VII

On Foot

SECURELY anchored on the mud out of arrow shot from shore we employed ourselves as Nankivell had suggested and sorted out our gear. The first question that came up was naturally what weight we should attempt to carry with us. My only experience had been with the army pack and I suggested sixty-five pounds as the correct weight, a suggestion that met with a groan from Nankivell. Mariston and Willis from the depths of their experience negatived my suggestion.

"Sixty-five pounds is all right, Dunc, in temperate weather and when you are going over decent roads," said the latter, "but when you tackle jungle going you'll find that you can't stand up under it. Forty is more than a man can stand unless he is an unusually husky specimen. Thirty-five pounds is nearer right. Ten pounds of that will be taken up in gun and pistol which leave just about twenty-five pounds of impedimenta for each man to carry. What with pack-harness, ammunition, medicines, two ponchos, a mosquito bar and all the rest of the stuff that we don't dare to leave behind, I am afraid that most of the *guarana* and all of the *sarque* will have to stay here."

"No matter what else goes, I insist on a razor," said Nankivell.

"You *would,*" snorted Mariston. "I presume that you also want to carry a mirror and shaving soap."

"Certainly," said Nankivell, "I'm trying to help Ray cut down weight."

"How on earth is carrying a razor and junk like that going to help to cut down weight?" I asked.

"George Duncan, I am surprised at you," said Nankivell. "With your so-called scientific education, you should see the point at once. The average beard weighs fully half as much as a safety razor. When you multiply that weight by five——"

"Oh, shut up, Frank," interrupted Mariston, "we'll let you carry a razor if you insist but I'll warn you that there's no use in it. It will be love's labor lost for we won't meet any young and attractive ladies where we are going."

"You can't tell," replied Nankivell, "I have a premonition that we will. At any rate, you three can look like tramps if you want to, my mother raised me to be neat no matter what the handicaps."

Besides Nankivell's razor, mirror and soap, we limited our equipment to four Springfield rifles and one shotgun (carried by Pedro), five Colt automatic pistols, seventy rounds of ammunition for each gun, a compass, a flashlight on the generator type which required no batteries, two ponchos, one mosquito bar, a small kit of medicines, two canteens of one quart size, a *machete,* a pocket axe, four ounces of salt, a housewife, two pounds of chlorine tablets, a pocket filter, one pint of brandy, two extra handkerchiefs each and a few odds and ends that Willis and Mariston pronounced essential. The balance of our loads was made up of *guarana* and four pounds of *sarque* which we carried for emergencies. At the last moment Willis slipped a small monocular into his pocket and Nankivell added a carton of cigarettes and a burning glass to his load. The rest of our food and equipment was divided into two portions. The first consisting of a light load for one canoe and that was wrapped in oiled silk and deposited in the canoe which we proposed to leave at our landing place as a line of retreat. The balance was loaded into the second canoe and consigned to the care of Diego and Oton with orders to leave it at Itaituba in charge of *Don* Esteban for us in case we ever returned to claim it, a matter of which I, for one, entertained grave doubts.

The loads were made up well before nightfall and as soon as the packing was completed, Diego and Oton climbed into their canoe and with many frightened glances behind them and with many invocations to the saints and to the jungle Gods, they turned the head of the craft downstream and left us. What happened to them we never learned. Aside from one brief glance which was vouchsafed us later, we never saw them again. Whatever may have happened to them, they never reached Itaituba, or if they did, they never delivered our goods to *Don* Esteban. Whether they sleep in the mud of an unnamed tropical river or whether their heads are drying in the huts of the Indians, or whether the promise of sudden wealth proved too great a temptation for their honesty and on reaching the Tapajos they turned the head of their canoe south toward Manoel Cardoso, peace be with their souls. They were faithful servants while they served and whether faithful unto death or whether they live afar from our purview, it matters not at this late day.

The five of us who were left settled ourselves for the night in our remaining canoe, resolving to enjoy a dry bed for at least one more night, for both Willis and Mariston warned us that it might be our last for some time. The night passed quietly and without interruptions and we could hardly believe that it was daylight when Mariston, who had the last relief, called us. We ate a hearty breakfast, feasting for the last time on the tinned delicacies that we had brought with us and then with cheerful faces, although I expect that the cheerful outside demeanors hid more quaking hearts than mine, we poled our canoe slowly and laboriously to the bank and debarked. Before leaving it, we drew it well up on the

bank and covered it with palm fronds in the hope of finding it later when we needed it.

"This is largely a waste of time," remarked Willis as we did so. "The termites will have it eaten up in two weeks, but it will make us feel better anyway. I didn't think, when we left Bacabal, that we might have to abandon it or I would have got canoes made of mahogany, the nearest termite-proof wood there is, but I didn't and so we'll have to do with what we have. We probably will never find it again anyway, so it don't much matter. Well, forward march and the devil take the hindmost!"

"Lead on, MacDuff," proclaimed Nankivell. "Tell mother that I died game and that the one bit of wisdom that I have gathered during a short and sinful life is that it isn't safe to count on the seven showing up more than six times in a row."

The road through the jungle proved to be even more difficult than Willis had prophesied. For the first two hours the path was dry and fairly open, requiring only short detours to hold our direction, but as the day wore on the ground underfoot became softer and the jungle became more dense and harder to break our way through. Pedro led the way, his Indian instinct for direction being considered the best guide we had, while Mariston brought up the rear with the marching compass on which he checked our course every half mile.

The heat was terrible. I had thought that it was about as hot as the human constitution could stand on the river but by comparison, the river trip had been cool and pleasant. Even the heat was a small matter in comparison with the torture inflicted on us by the insect life. The mosquitos were legion while the ticks forced us to stop every mile or so and pull them off one another before going on. Only Pedro seemed to be exempt from them. Whether his skin was too leathery or whether they all left him for the more appetizing odor of the white man, I don't know, but it is a fact that none of them got on him. Willis told me that the Indians were never bothered with them and that that was why they could live in a jungle that would kill off a white man in a few weeks. The leeches were bad too, but they only bothered us when we went into water and after wading a few streams we learned to stop on the farther side and pick them off our legs before going on.

THE road got worse and worse. The jungle was so thick by mid-afternoon that it was necessary to keep a man with a *machete* in front to cut the *lianas* before the rest of us could make our way forward. I don't believe that we made over eight miles in the whole day before we were forced by sheer weariness to halt for the night. Fortunately we found a fairly high spot that was comparatively dry under foot and were not forced to sleep in six inches of water, an occurrence that Willis assured us was not uncommon in jungle travel.

"Is it really necessary to mount a guard tonight?" asked Nankivell, when we halted.

"We really ought to," replied Willis. "Remember we were attacked only a few miles from here, but we haven't seen or heard anything of Indians all day and I am inclined to let the guard slide for tonight. The Indians can see like cats and if they really want to bump us off, they can do it without danger to themselves and the most that we could hope to do would be to take a few of them along with us. We are all so tired that I doubt whether the one who was put on guard could stay awake. What do you think about it Pedro?"

"I am a dead man already and dead men should not speak," replied our Indian friend. "For myself, I can stay awake, but whether I could hear an enemy approach I cannot say. My hearing has been blunted by the sound of the drums. It is better that we all sleep and if we go to the Great Spirit that we go refreshed and not with the sand of sleep heavy in our eyes. What says *Señor* Bob?"

"We might as well get a good night's sleep and take a chance at it," said Mariston. "Personally I feel like Pedro does. I doubt if I would be of any value as a guard, even if I could stay awake, and if we have to go west, let's go rested up like gentlemen."

"Amen," said Nankivell. "Like Willis, I crave sleep. Let's eat a bite and go beddie-bye with a clear conscience and trust to Lady Luck to do her stuff."

None of us awoke until it was broad daylight. Nankivell was the first to wake and his whoop brought the rest of us up instantly.

"Look at me!" he cried. "I'm poisoned! I've got scarlet fever, measles, hives and mumps all in one."

I laughed as I glanced at him. His face was as red as a beet and was swollen into lumps like mosquito bites and this despite the fact that we had slept under our bar. In addition he had several globules hanging on his face that looked like small grapes. I laughed at his condition but the effort of stretching my face revealed to me that my condition was no better. Mariston and Willis were similarly afflicted as was Pedro in a lesser degree. Willis solved the mystery.

"Those purple affairs are just ticks full of blood," he said. "Pedro will show you how to take them off without leaving the head in your skin. The red lumps are chiggers. They will itch like the devil for a few days and then fester, that is if you leave them alone. They'll fester at once if you scratch them. Leave it to Pedro; he'll fix you up."

The itching was almost intolerable and the temptation to pull off the filthy ticks was almost more than I could resist but I knew that Willis had had more experience in tropical jungles than I had and I waited with what patience I could muster while Pedro left us and scouted around in the nearby jungle. He soon returned with some roots and some branches bearing leaves and berries. The berries he crushed and touched the ticks with the juice. The effect was marvelous. The insects promptly withdrew from us and releasing their hold, fell on the ground before us. The raw wounds that were left Pedro dressed with the chewed-up leaves which promptly stopped the bleeding and relieved the smarting almost instantly. The roots he cut into slices and told us to rub our chigger welts with them. This relieved the itching to a great extent and insured us against the welts festering, according to Pedro. He spoke the truth for none of us was bothered with any festering except one on Nankivell's shoulder that he neglected to rub. This gave him a little trouble later, but nothing serious.

Once our bites were doctored to an extent that we were able to think of something besides how they itched, we turned our attention to breakfast. This was, perforce, a rather sketchy affair but we did justice to the scanty fare which our packs provided and after smoking one each of Nankivell's precious cigarettes, we were ready to start our grind again.

The morning was a repetition of the first day. Toward noon the going began to get a little easier and we found the dense jungle giving way to somewhat more open ground.

"We are getting away from the river and the swamps that surround it and upon a little higher ground," said Willis in explanation. "Pedro thinks that by night we will hit fairly good going although I think that he's a little too optimistic. This is an improvement over yesterday and we ought to make fairly good time this afternoon even if we can't see twenty feet ahead. It is about eleven now and I think we had better stop for a bite and a *siesta* before long. I'm ready to stop right now if the rest of you are."

We were more than ready to rest and we thankfully unslung our packs and threw our tired bodies on the ground. Pedro busied himself about his daily task of securing our food. The supply of *guarana* was small and had to be carefully husbanded so he left us and strode forth into the jungle with the shotgun in search of something edible. He found no game but he returned shortly with some fruit and edible tubers on which we lunched and then took our *siesta,* leaving Mariston on guard.

Pedro's prediction of easier going was borne out and by nightfall the jungle was much more open and we found that we had covered about thirteen miles during the day. The following day we made eight miles before lunch but the ground began to get softer under foot and by nightfall we were almost in a morass with only three miles to our credit since noon.

"I don't like this," said Willis. "We are getting into worse ground every hour and we may have to retrace our steps. However we'll stick on in the same direction for a while tomorrow and see what happens."

The morning of the fourth day brought a little improvement and by noon we were back on fairly hard ground although the jungle was unusually dense and we could not see ten feet into its thickness. We found a little open space under a mahogany tree and threw ourselves down to rest while Pedro made his daily foraging trip for food.

He had been gone for perhaps five minutes when a sound broke in on the comparative stillness that brought us to our feet with a jerk. Far away and distant it was but it was unmistakable. No one who had heard the blood-curdling scream that had greeted us on the river bank four days before would ever mistake that sound for anything else. With blanched faces we gripped our rifles and stared at the jungle, expecting every moment that some monstrous horror would burst forth.

"Where is Pedro?" asked Nankivell anxiously.

Again came the scream, this time perceptibly nearer than it had been before.

"It's closer," I said, feeling that I must break the silence that had gripped us.

"Worse than that," replied Willis. "The thing, whatever it is, is following our trail."

My face blanched as a fresh scream testified to the truth of Willis' observation. It was very evident that the sound was approaching along the route we had traversed that morning. There was a rustle in the jungle and Pedro joined us, his swarthy face almost chalklike with terror.

"The *Guardian of the Jungle,*" he gasped as he joined us. "*Señores,* pray to whatever Gods you worship, for the man lives not who has looked on the *Guardian's* face."

"Is he that homely?" asked Nankivell with what was evidently a forced attempt at his usual tone of light banter.

"*Señor* Frank, no one knows," replied Pedro solemnly. "His voice is known to many, his tracks to few and his face to none who lives."

"What is it, Pedro, a devil or a wizard or just an animal?" asked Mariston.

"*Señor* Bob, his voice you hear and his tracks you have seen," said Pedro, "and what he is, you know as well as your servant. *Señor* Dunc is said to know everything; can he not answer your question?"

"From the footprints I would judge it to be a small carnivorous dinosaur," I replied. "If I am right, we had better scatter out a little so that some of us may have a chance. If we bunch up he can get us all, but if we get far enough apart we may be able to pump enough bullets into him to stop him while some of us are alive to tell what he looks like."

Again the hideous voice sounded on the jungle air. It was quite a bit nearer this time and any lingering hope that we may have held that the author of that cry was not following our trail was dispelled as we gauged the direction from which the noise came. Once I had named a tangible enemy and suggested a way to combat it, Nankivell's spirits rose like magic.

"Come ahead, Caruso," he called gaily, "you need some singing lessons and old buddy Springfield is just the man to give them to you. Dunc, you know his ancestors, don't you think that a few pills in his throat will help his voice?"

"You had better shoot at his heart," I replied drily, "and let his head and throat alone. His brain is probably so small that even a dead shot like you aren't, couldn't hit it, and he probably wouldn't have sense enough to know that he was dead, even if you hit the brain square. Don't you think that we had better scatter, Bob?"

"I don't know what to say," replied Mariston. "The jungle is so thick that he might easily finish us off one at a time without the rest getting a chance to fire a shot. I think that a skirmish line about ten feet apart is the best formation. When he appears, let everyone close up enough to get a good shooting target and pump lead at his heart as fast as you can work your bolts. I'll hold the center here and two of you cut off to each side. It's too bad that there aren't a few good high trees that are slim enough for us to climb."

CHAPTER VIII

The Guiding Arrows

WE spread out as Mariston had suggested and waited with bated breath. I don't know how the rest felt but my heart was going like a trip hammer and I entertained serious doubts as to my ability to hit the side of a barn if it had appeared suddenly before me. Again the horrible scream sounded, not over a quarter of a mile away, so close in fact that the peculiar bubbling grunt that ended it was plainly audible. Nankivell, who was literally dancing in his excitement, threw back his head and emitted a wailing screech that was a very passable imitation of the voice of the *Guardian.* Willis turned toward him angrily but before he could speak another sound was heard that claimed our attention. Soft and distant and sounding as though it

was coming from the interior of the hearer's head came the sound of the drums.

Pedro howled and threw himself face down on the earth. The rest of us stood immobile while louder and louder, or rather, more and more intense grew that hammering in our ears. I tried vainly to stop my ears against it with my fingers but that device served merely to intensify the thudding and I withdrew my fingers. Recalled suddenly to my senses, I grasped my rifle and looked for the enemy that we were expecting. He was nowhere in sight and his vioce was for the moment silent. Insensibly we abandoned our plan of defence and drew closer together.

As suddenly as it had begun, the drumming stopped and again rose the wail of our pursuer, but this time it was beyond us. As though it had stopped merely to allow us to hear the howl of the *Guardian*, the drums again started their maddening throbbing but this time in a more subdued tempo so that over their voice we could hear our enemies in the jungle. The howl was repeated from behind us and was at once answered by another before us. We exchanged frightened glances and again the howls sounded. This time there were three separate cries and we could hear heavy bodies moving in the jungle. It was evident that our pursuers were circling around us perhaps two hundred yards away in the dense jungle.

"I expect that the brutes are working up an appetite for dinner," said Nankivell with a game attempt at nonchalance. "It's too bad that the old bird, who located us, called his friends to help him out. From what Dunc says, the five of us would just make a good meal for him."

"I'll feel better when the attack commences," said Willis with a wry smile, "this waiting gets my goat. Dunc, do you suppose that the brutes who are doing that yelling are responsible for that damnable drumming?"

"They might be," I replied, "but it hardly seems plausible. That drumming is more likely a wave motion of some frequency that we——"

"Dunc," interrupted Nankivell, "I can almost be resigned to sudden and painful death if you will just postpone your scientific lecture until it is over. Man, don't theorize now, you'll soon have all eternity to do it in."

"Quit your squabbling, you two fools," said Mariston severely. "Keep your eyes on the jungle and your minds on your guns. What was that?"

"That" was the keening *whish* of an arrow that passed between Mariston and myself and struck with a dull thud in the ground some distance away. Pedro looked up suddenly at the sound and as he saw the arrow called to us to drop flat. We obeyed him and scrambled around into a rough circle so that we covered with our rifles every direction.

"What a time for those benighted savages to pick for an attack," complained Nankivell. "It seems to me that they had better join forces with us instead of shooting at us considering what's loose in the jungle."

"For once you are wrong, Duncan," exclaimed Mariston.

"How so?" I asked.

"There are no carnivorous dinosaurii loose in this jungle or you can bet your bottom dollar that our friends, the arrow shooters, would be scarce and making themselves scarcer," he replied. "These boys can be killed by a bullet placed in any one of several locations. Keep your eyes peeled in earnest, but don't shoot unless you are sure of a hit. We haven't any ammunition to spare."

Vigilantly we scanned the jungle. The drumming which had subsided into a mere whisper grew slowly more pronounced and threatening. Threatening is not the right word to describe it, more hopeless would be better. It had the peculiar psychological effect of depressing the stimuli greatly and engendering a feeling of absolute helplessness and despondency. As the drumming grew more evident to our sense of hearing the utter hopelessness of the fight that we were making against almost insurmountable obstacles and against unknown foes bore in on me. I felt like throwing down my rifle and bursting into tears.

Again came the *whish* of an arrow and the missile buried itself in the ground about six inches ahead of Willis' head. Another and another flew through the air, striking almost in the same spot, but an inch or two nearer Willis. He grunted and drew back a foot. Another arrow flew, this time striking only a few inches ahead of where his shoulder was after the move. He drew back again and an arrow struck dangerously close to me. I hastily joined Willis in his retrograde movement and another pair of arrows drove us still farther back. We were almost on top of Nankivell and Mariston, in front of whom no arrows had fallen.

"Move ahead a bit, will you?" said Willis, "the beggars are getting our range here."

The whole circle moved forward a few feet. While we were moving no arrows fell but as soon as the movement stopped again came the shrill *whish* and an arrow plumped into the ground a few inches from my new position. Willis studied it and sprang suddenly to his feet.

"Get up, fellows," he said. "Those arrows weren't shot to hit. If they had been, Dunc and I would have gone to the happy hunting ground long ago. They are merely warnings to us to move on in a certain direction. Get up and move ahead in the direction they want us to go and I'll wager there won't be another one fired."

Nankivell and Mariston demurred, but I joined Willis in insisting that we try his plan. They had not been under fire and could not appreciate our feelings but in view of our insistency they agreed to try it. Their decision was marvelously strengthened by an arrow that struck the ground between them, the only one that was fired while we were arguing. We got slowly to our feet and, as Willis had predicted, no arrows were fired.

"We might as well take our kit," remarked Mariston as he stooped down and picked up his pack. The rest of us followed suit and stood in a group undecided as to which direction we should go. With the beginning of the arrow attack the howling in the jungle had ceased, but the undertone of steady drumming had gone on without intermission.

"Which way shall we go?" I asked.

"Try any way," replied Willis. "If we start out on the wrong direction an arrow will soon tell us so."

"We had better head off to the right," said Mariston. "The last howls we heard showed nothing in that direction."

ONE way was as good as another, so with Willis in the lead, we started off.

"Hello, we're on a trail," he exclaimed in surprise after we had gone a few feet. We looked down and there

was no doubt but that he was right. It was a very faint trail, but it was none the less evident that feet of some sort had trodden that way before us. The trail soon bent off sharply to the left and Willis followed it. For half a mile we were not molested. At that point the trail split and branched off in two directions. We halted and studied it for a moment and then Willis took the left-hand path. Instantly there sounded that now familiar *whish* and an arrow streaked through the air before his face.

"Wrong road," he said drily and turned back and took the right-hand path. There was no impediment to our progress in that direction and we forged steadily ahead. The trail was rough but entirely practicable and we made good time. The jungle grew denser and denser and but for the path, we could have scarcely forced our way through it. The trail turned and twisted continually and we soon lost all track of direction. The jungle overhead was so dense that not a ray of light filtered down to us and even Mariston who carried the compass soon confessed that he had no idea of what direction we were from our starting point. For two hours we forged steadily ahead and then Willis stopped with a gasp.

"What is it?" asked Mariston from the rear of the column.

"Either I have gone crazy or we are learning something that no one ever suspected," he replied. "There is a road ahead and what's more, it's paved."

"What?" cried Mariston incredulously.

"It's paved as sure as I'm a foot high," replied Willis positively.

We crowded forward. There was no doubt about it. The trail we were following was intersected almost at right angles by the road, perhaps ten feet wide, that was paved with a gray substance somewhat resembling concrete. We looked at one another with awed faces and Willis spoke in great excitement.

"We're on the right trail, all right," he said. "The same men who made that knife made that road as sure as I'm standing here."

"It sounds plausible," said Mariston. "At any rate, scorn not the gifts that the Gods provide. I'll be glad to get some decent walking again. What is that pavement, concrete?"

I advanced to the road and knelt down, but I could hardly believe the evidence of my senses. The road had all the appearance of concrete, but it most decidedly was not built of rock or anything of the sort. It was firm to the touch, but it had a certain indefinable yielding quality that we are accustomed to associate with but one thing.

"I believe that it's paved with some compound of rubber," I announced.

The rest laughed, but their laughter was changed to amazement when they, in turn, examined it.

"It *does* feel like rubber," admitted Mariston. "It is not as surprising as it might be. I am enough surprised at finding a road here at all that it might be paved with ice-cream and not astonish me much more than the road itself does. Well, we can't stop here and worry about it too long, our guides may get impatient. Which direction shall we try?"

Nankivell put his fingers to his lips and emitted a shrill whistle.

"Taxi!" he shouted.

"Oh, shut up, Frank," I exclaimed testily. That confounded drumming had got on my nerves. "Don't make an egregious ass of yourself."

"Ass, nothing," retorted Nankivell. "Where there is a road like this, there is a taxi, or I miss my guess as to Henry Ford's enterprise. Let's wait for it."

"Quit squabbling and come on," said Mariston laughingly. "We won't wait for Frank's taxi. I, for one, am glad enough to get a good road underfoot again to be game to walk a good many miles."

At a venture we turned to the right. Apparently we had chosen the right direction, for no warning arrow whished across our path. I remarked to that effect and Willis stopped in his tracks.

"Maybe we have lost them," he suggested. "There hasn't been an arrow for an hour."

He turned and started the other way. Immediately the drumming increased in volume and the *whish* of an arrow in front of his face turned him to the right-about in short order.

"It's funny that we have never got a sight of those beggars," he said. "It is uncanny the way they keep out of sight. Oh, well, they apparently don't intend to harm us as long as we obey orders. Forward march and we'll see in time what it's all about."

"I don't know where I'm going, but I'm on my way," caroled Nankivell cheerfully as we turned our faces in the direction indicated by our unknown guides and plunged forward still farther into the unknown.

CHAPTER IX

Nahum

WE trudged along the road for the best part of three hours. Nankivell was the only one of us who kept his spirits up. He whistled and sang alternately, varying his performance by remarks upon the glum appearance presented by the rest of us. Willis and Mariston said little. They were old soldiers of fortune who had learned long ago to take things as they came and to save their breath for emergencies. It was not Pedro's way to speak unless spoken to and I was too puzzled, and I might as well admit, frightened, to care to talk. The road turned and twisted interminably so that we could seldom see for more than a hundred yards ahead. It was evident that we were going up a slight grade and, although the jungle hid the terrain pretty well, we could at times see hills ahead and expected some pretty steep climbing before we had gone very far.

We turned a bend in the road and stopped. The road ran squarely up to the side of a hill several hundreds of feet high and ended abruptly at a huge copper-bound mahogany door. We looked at one another in doubt as to our future movements, but no astonishment was shown in any of our faces. After finding that paved road, nothing to which it might lead us could cause us any wonder. Nankivell walked up to the door and rapped sharply with his rifle butt.

"I hope they are home," he remarked with a comical air of solicitude, "it would be a shame to come all this distance to make them a call and then find no one in."

There was no response and Nankivell hammered again on the mahogany barrier. We waited for a moment, uncertain as to our future movements, when Willis gave vent to a sudden exclamation. The door was moving slowly and noiselessly downward. It moved

very slowly and it was perhaps thirty seconds before it had sunk to the level of the roadway and the path was clear before us. The road ran into a tunnel in the hill and ran in a straight line for as far as we could see. We looked at one another questioningly.

"Age before beauty, gentlemen," said Nankivell cheerfully. "I suggest that Bob lead the way."

Mariston hesitated for a second and then stepped forward.

"Come on," he said quietly as he started, but I noticed that he slipped the safety off his rifle as he did so and I followed suit. We crossed the crack that held the door, and I noticed in passing that it was fully eighteen inches thick. As we passed into the tunnel there was a slight scraping sound behind us and I turned quickly. Swift as my movement was, I was just in time to see a crack at the top of the door close. That huge door which had taken thirty seconds to open had risen into place in less than a second, shutting us off from the outside world as effectually as death itself would have done. As the door closed it shut off the outside light and it was as dark as the inside of a tomb.

"Who has the flashlight?"

Willis' voice sounded preternaturally loud in that confined space.

"I have it," replied Mariston. "Nobody move while I get it out and wind it up."

We could hear the steady rasp of the winding key, but before Mariston had finished winding the need for the light had passed. There was a flash, blinding in its intensity when compared to the darkness that had enveloped us, and the tunnel was as light as day. I turned from the direction of the door to search for the source of the light, but my gaze was arrested by the sight that met my eyes.

Before us stood a white man. He was evidently old, for long curling locks of intensely white hair framed a face that was wrinkled and ancient looking. His tall spare figure stood without the slightest trace of a stoop, and despite the appearance of age conveyed by his face, there was an air of strength and power about his figure that made me wonder. He was attired in a long white robe with a scarlet border which was heavily ornamented with gold embroidery, and around his neck was a chain made of flat plates engraved with symbols of some sort, and from it depended a small glittering sword of silver. He was bareheaded and on his feet were white sandals bound to his feet with crimson ribbons, heavily encrusted with gold.

All of those details I noticed later, for at first sight the thing that arrested my gaze was his piercing black eyes, that looked out from under a nobly tall brow, and which seemed to be looking through me into the very depths of my mind itself. There was a terrible air of majesty about his figure and his eyes spoke eloquently of power. Power was reflected, too, in his jutting jaw and his firm thin lips and his high-bridged hooked nose. Yet there was an air of kindliness and justice about him, too, that reassured me slightly. He stood there with folded arms and stared at us in silence. Nankivell recovered from his surprise and found his voice first.

"Ah, good evening, Brother Tiler,"* he exclaimed, advancing with outstretched hand. "You see before you brethren from a far distant land who seek at your hands the blessings of aid, relief and fraternal assistance——"

"Shut up, Frank," said Mariston sharply and advanced toward the silent and immobile figure. "Do you understand English, sir?"

There was not the slightest flicker of understanding on the majestic face and Mariston turned to Willis.

"Try him with Spanish and Portuguese, Ray," he said.

Willis advanced and spoke in each of the languages in turn without achieving any better results than Mariston had with English.

"You try him, Dunc," he said to me.

I spoke to him in French, German and Italian and what I could remember of Latin and Greek, but with no apparent result. When I had finished, the unknown began to speak. His voice was low, clear and beautifully modulated, but the language that he used was unintelligible to all of us. There was a haunting familiarity about it that I strove in vain to place but could not, although I was certain that I had heard speech like it somewhere before. When he had finished his speech he bowed and, motioning us to remain where we were, he stepped backward for a few steps and spoke, apparently to the wall. He spoke for several minutes and then paused, listening for a reply. Another voice answered him, apparently from the wall before him, and he turned again to us and apparently asked a question in his unknown tongue.

"He is evidently asking who we are," said Mariston. "He knows all the languages that we speak and so he can't really expect a reply."

"Something about that speech is familiar," I said. "I don't know what it is, but it sounds like one that I have heard somewhere. It is quite possible that he may be able to make out a word or two of what one of us has said to him. Suppose we each tell him who we are and how we came here in each language that we can speak. Possibly he can make something out of one of them. I'll start it out, if you like."

Mariston nodded assent and I started, naming each one of us and relating a short outline of our travels in each of the languages that I could speak and essayed to do the same in the classical tongues, although I fear that I made a mess of it. When I had finished, Willis took up the task in Spanish and Portuguese and Mariston repeated the information in English. No trace of enlightenment passed over his face, but when we had done he looked inquiringly at Pedro. We pushed Pedro forward and made him tell our yarn in each of the Indian dialects that he could speak. When he had finished, the unknown looked inquiringly at us again.

We made no reply and he was apparently satisfied that we were through, for he retreated again and spoke to the wall. The voice replied and several questions were asked and answers given. The information, which he was evidently transmitting, was apparently satisfactory, for the colloquy ended and the unknown approached us. He took up the tiny sword that depended from his collar and pressed the point against the foreheads of each of us except Pedro in turn. When he had completed the ceremony he stepped back and bowed.

"You have permission to enter," he said in faultless English.

"Do you know English?" asked Nankivell with a gasp.

"Yes, Mister Nankivell," replied the unknown with a smile. "I understand English perfectly and speak it as well as I do my native tongue. I also understand

*Doorkeeper in a Masonic lodge.

and speak the Indian dialects, Spanish, French, Portuguese, Italian and German as well as the gentlemen who spoke them, and I believe that I speak purer and more fluent Latin and Greek than Mister Duncan. My reason for not sooner acknowledging my acquaintance with those languages was my desire to hear each one of you tell your story, in order that I might determine how far each of you deviated from the exact and literal truth. You seemed to note something that was familiar to you about my speech, Mister Duncan. For your enlightenment, I will inform you that it is a slight variant of ancient Hebrew."

"Well, who the dickens are you and where are we?" asked Nankivell. "Since you know all about us, why not tell us something about yourself?"

"That is information that will be given you in due time if the Master so orders," he replied. "In the meantime, you will follow me without questions. You will also leave your weapons behind you. They will not be needed and would be both an offense to good taste and a useless burden."

"Lay your rifles down, fellows," said Mariston. "This gentleman speaks the truth."

"And your pistols," replied the unknown with a smile. "Had harm been intended to you, you would not have escaped the arrows, or you could have been overcome in the darkness when the portal closed."

"And your pistols," repeated Mariston with a sheepish grin. "May I ask whom we have the honor of addressing?"

"My name," he replied, "is Nahum and my rank is that of Warder of the Outer Gate of the Crypt. Follow me without further questions."

WE followed him down the tunnel for about two hundred yards. At that point the tunnel stopped and ended abruptly in a wall of solid rock. Nahum stepped to one side and spoke some words in his own language. Knowing what it was he was speaking, I tried to make it out, but my knowledge of Hebrew was too slight for me to do so. As he finished speaking a section of the wall slid slowly down, giving entrance to a small room fitted with a number of comfortable-looking chairs, fastened to the floor and all facing in the same direction. The thickness of the rock door that we crossed amazed me. It was fully fifteen feet thick and I hastily tried to reckon the weight.

"Be seated," said our guide.

We did so and the massive door closed. Nothing else happened for a few moments and than I was conscious of a slight sensation as of falling in the region of my stomach.

"Are we moving?" I asked.

"At something over two hundred miles an hour," replied Nahum with a smile. "You probably noticed that we are decreasing our elevation. The grade that we are on is less than two per cent, but the speed at which we are moving gives you the sensation of falling. We will start up again in a few minutes and then the sensation will cease. I can see that you are about to ask further questions. Pray do not force me to the incivility of again refusing to answer you. All that you should know will be told you in due time. You may smoke if you like, Mister Nankivell."

The irrepressible Nankivell lighted a cigarette and puffed luxuriously, while he leaned back and whistled between puffs in affected nonchalance. Fifteen minutes passed without an incident and then our guide rose and spoke again to the wall. The side of the room dropped and we were ushered into a corridor that was the exact replica of the one we had left. We followed our guide for perhaps a hundred yards down it and then he paused. He said nothing, but he must have pressed some hidden lever with his foot, for another section of the tunnel wall slid down and we followed him into a brilliantly lighted room.

It was fitted up with every luxury that could be asked for, a curious Oriental note being dominant in the furnishings. Our guide turned to us.

"This will be your home for the present," he said. "You will find two bedrooms, each equipped with two beds for your use. Your servant will be lodged with others of his rank and your wants supplied by others of his race, who are trained in our ways. You will find baths and everything that is needed for your comfort. When you desire servants to attend to your wants, face this wall and speak in a natural voice and they will attend promptly. Mister Nankivell, you will find a razor and a mirror that will be of more value to you than the metal mirror you have been using. Suitable clothing has been provided for you and your evening refreshment will be served in an hour. I shall do myself the honor of returning and sharing your meal with you. In the meantime, I trust that you will be comfortable. Is anything lacking to your comfort or peace of mind?"

"Just one thing," said Nankivell. "You said that Pedro would be lodged somewhere else. We would rather have him stay here with us."

"Your request will be communicated and an answer returned in due course," replied Nahum. "In the meantime, my orders admit of no deviation and he must accompany me."

"I don't like that a bit," said Nankivell. "Pedro is not a servant to me, he is a darned good friend and he is entitled to as good treatment as the rest of us get."

"He will be entirely safe and will be treated well," answered Nahum. "He will be lodged with others of his race and will be perfectly comfortable. I regret that it is necessary to separate him from you, but as I said, my orders admit of no deviation."

He bowed deeply and retired by the route by which we had entered, followed by Pedro. The huge stone slab shut behind him.

"Well, what do you know about that?" exclaimed Nankivell, sinking into a divan.

"Take the gifts that the gods provide," said Mariston sententiously. "I am going to take a bath."

"Wait a minute, Bob," said Willis, "let's talk this over a little. I managed to get a word to Pedro before he left and I asked him if this duck was the wizard whom he had met years ago. He said it was not, although the other wizard was very like this one. He's also a dickens of a lot like that chap who died in my tent two years ago, but again he's not the same."

"Are you sure he's not the one who died in your tent?" asked Nankivell innocently.

"You know well enough what I mean," retorted Willis. "This whole business is beyond me, but it is evident that we have found what we went after and it is more mysterious than my wildest dreams. I have heard rumors of the existence of a race of white wizards in

(*Continued on page 737*)

The Globoid

¶ *"Get back to the compound and tell your father to keep away from here," he commanded.*

HEYWOOD CROMBIE, corporal of the Interplanetary Flying Police and holder of the 2124 Efficiency Medal, was spending his first sleeping period on Venus for three years in a strange manner. He was sitting in a small metal closet attached to the room assigned to him, peering out of the slightly opened door at the far corner of the windowless room at his bed. And on the bed, where Crombie's weary body should have been lying, reposed an effigy of himself, a sheet covering all but a shock of red hair and what in the semi-darkness might have been taken for part of a face.

The bedroom itself was artificially cooled, a delightful haven of repose for one who had all day long piloted a flying ovoid through the steaming murk of Venus' north polar regions, but the little closet was not so cooled, and the ceaseless warm rains that poured down its outside shell kept the humid air of Crombie's retreat at an effective parboiling temperature.

Silently but with conviction Crombie cursed himself for his slavery to "hunches." As he was about to slip into soothing slumber in the wide, deep bed, something had jerked him to wakefulness. Something had impelled him to drag his protesting limbs across the room into the purgatory he was now enduring. Something had forced him to keep his leaden eyelids open and to deny himself the rest for which his body tormented him.

His "hunch" had already cost him half of the nine-hour sleeping period. It was likely to cost him the other half. Life at the mine colony was regulated by chronometers and bells—not by the dim blob of the sun, that occasionally could be seen, riding high around the polar horizon interminably.

It was hard to understand how danger could threaten.

Terror

By R. F. Starzl

Author of "Madness of the Dust," "Out of the Sub-Universe," etc.

IT has just been brought to our attention, via a newspaper clipping, that Mr. Starzl, who continues to get an increasing number of followers among scientifiction fans, uses his imagination and predilections toward science for other things besides writing. He actually does some experimenting with the subjects of some of his stories. We doubt if our author has had any personal experience with at least one of the dangers which he writes about. We do know, however, that "The Globoid Terror" is an absorbing tale of scientific interest and well worthy of the author. Also, we know that you must not miss reading this story.

Illustrated by MOREY

The door was securely locked and bolted on the inside. There were no windows. Light and air were supplied by foolproof mechanical means, while the cooling liquid was circulated between the webs of the metal ceiling.

Immersed in bitter musings, Crombie at first failed to hear a slight noise in the air-intake duct on the wall opposite his hiding place, but a moment later came the sharp scrape of metal. All his senses alert, he could barely make out a hand reaching through a neat hole cut in the ventilator screen. It was a long, writhing hand with seven white fingers, recognizable at once as the hand of a native Venerian. With consummate skill it removed the invisible locking device on the inside, removed the whole screen, and lowered it gently to the floor by means of a cord.

The body of the creature now appeared. Like all Venerians, it suggested, to some extent, an extremely emaciated human being. Over six feet in height, it was so slight that it crept through the nine-inch-square duct without difficulty and bounded soundlessly to the floor. Possessed of a long, thin arm that grew from the middle of its chest, it manipulated this member with such skill and dexterity that the absence of a second arm was hardly noticeable. But Crombie was not interested in the odd appearance of the visitor. "Look out for the Venerian" had long been a stock procedure in the methods of the Interplanetary Flying Police, and Crombie knew that in those long, melancholy heads there was a store of cunning sufficient to make up for any physical deficiency.

A twin of the first intruder now appeared. He pushed before him a metal box which he handled most deferentially. Momentarily he touched fingers with the one who had preceded him, conveying his thoughts. The other nodded, took the box and carefully set it on the floor beside the bed.

The first Venerian started to pick up the sheet to expose the man he thought was underneath it, but desisted as again the other's fingers sought his. Their hands tangled in lengthy and animated conversation. Finally they both nodded. The one who seemed to be the leader picked up the box, and gingerly holding it over the head with the red locks, opened it and let the contents fall. The box contained a fluffy black mold that clung to everything it touched with a strange and horrible tenacity.

Rage coursed through the veins of the watching policeman. He was acquainted with the black mold. He had seen men, every bit as good as himself, accidentally touch a little of it in the dark, warm caves far underground during the Equatorial rebellion. He had seen the mold spread over their skins as fire spreads over the tall, rank grasses of Mars after the canals have dried up. He had seen them literally devoured by the voracious black vegetation, and he had helped burn the body of a dear friend and comrade—no—not the body—a mass of black mold in the sardonic semblance only of the human body it had absorbed and replaced.

With a roar Crombie bounded out of the closet. He seized the two emaciated necks of the would-be assassins and brought their heads together with a sound like the bursting of a pumpkin that has fallen from a wagon. Both dropped limp in his grasp; they were dead. Immediately Crombie regretted his action. He knew he should have kept them alive to sweat the truth out of them.

He threw the bodies against the further wall to remain until morning and turned his attention to the bed. The black mold lay quiescent on the red wig and pasty-complexioned false face beneath. The artificial coolness of the room made it a little sluggish, but Crombie knew that the warmth of his body would soon have awakened it to devilish activity. He focused the standard weapon of the Interplanetary, a D'Arsonval projector, on the bed, and saw the black mold turn gray in death. Assuring himself that he had covered every inch of the bed with the high-frequency beams, he rolled everything into a sheet and threw it into the waste basket. Then he sprawled upon the surgically sterile mattress and spent the rest of the sleeping period in profoundly blissful oblivion.

CROMBIE rose to the chime of a bell, and stepped into the adjoining bathroom, where he stripped and stood under the shower. When he pulled a chain the collected rain water from the roof, unfailingly warm, sluiced down upon him, and this was followed by a needle spray of ice water. He shouted to his heart's con-

tent when the cold water struck him, knowing that the soundproof walls would not permit anyone to be disturbed.

Speculating on the night's happenings, and regretting the sleep he had lost, the officer applied some depilatory soap to his three-day beard, wiped soap and beard off on a towel, and was quickly arrayed in the light waterproof garments customary on Venus.

On the way down to the factor's—the general manager's—private living quarters, he instructed a native servant to dispose of the bodies.

He waited in the breakfast room for the widowed factor and his daughter to appear, full of pleasurable anticipation for the meal to come, as was only natural for one who has cooked for himself in the cramped quarters of a police patrol flying ovoid.

"Good morning, sir!"

Crombie looked up as Factor Burgess entered the room, startled by the distinctly hostile tone of the words. Unconsciously he took professional note of the man on whose shoulders rested the responsibility for the huge diamond mine. Past middle age, tall and almost slight in build, with graying hair and aristocratic features, Burgess would have seemed more at home in the counting room of a terrestrial bank. Yet there were more than traces of the energy which had placed him in this responsible position. He carried with him an *aura* of command, overlain at the moment with anxiety.

And the load he carried was not small. Of course, the diamonds mined were not of the gem variety so desirable in antiquity. Fine gem diamonds had been produced artificially for years. The diamonds sought here were the incomparably hard and tough gray diamonds, which had taken the place in industry formerly occupied by the more common black diamonds, or carbonado "carbons" which had formerly been the best for rock drills and similar work. Throughout the far-flung solar system men were penetrating the very cores of the planets in search of minerals—in eager pursuit of mystery, and on Venus and Earth and Mars and even sun-blistered Mercury the rare and clean-cutting "gray carbons" from this lone mine were regarded with respect and affection by swaggering hard-rock men.

There was no relenting in the chilly look of the factor.

"I've heard the Interplanetary Flyers always get their man," he remarked with cutting sarcasm. "I see you've made an early start."

"Somebody made an early start. I merely finished it," Crombie said calmly. "What do you suppose those beggars were in my room for?"

"The poor fellows probably came to see if you were comfortable. As servants in this house, they should have the right to do that without being killed—murdered, I might say."

The officer reddened until his face was nearly the same color as his unruly hair.

"If you feel that way about it," he remarked, getting to his feet, "I guess I won't be your guest for breakfast."

"You'll eat your breakfasts in the guard-house for some time, my fine young fellow," Burgess retorted with rising anger, "when my report of this affair reaches headquarters."

"Speaking about reports," Crombie drawled, "you should be more interested in my report than I in yours. Remember, I have here in my pocket complete authority to investigate the affairs of this mine. You know as well as I do that production has fallen off in the past year from $175,000,000 to $90,000,000. You have given no satisfactory explanation of this loss and the company's engineers have not substantiated your theory that the mine is petering out. When the company sends an auditor to check up he disappears. . . ."

"He lost his way and wandered into the swamp."

"Maybe, maybe. Nobody has blamed you for his death. I might say the directors have been very lenient with you. No one has accused you of anything, but it is evident that someone is diverting the mine production and hiding the carbons for a real clean-up. That's what I'm here to investigate, and if you want to keep suspicion away from yourself, you'll assist me instead of putting obstacles in my way."

The factor's belligerence had collapsed, and his face was a mottled gray.

"I'm ready to help you," he muttered.

"Well and good," said Crombie. "Now, the first thing I want to do is show you why I had to kill those two rascals."

He led the way to his room, pulled the waste basket to light, prepared to show his evidence.

The waste basket was empty. The articles covered with the dead mold were gone; fresh coverings were on the bed. The damaged screen had been replaced with a new one.

Baffled and raging inwardly, Crombie made his way to the human mess hall, where some half hundred straw bosses, mostly Terrestrials, but with a sprinkling of huge, morose Martians, had their meals separately from the Venerian laborers. Here he made the best shift he could with the hearty but carelessly served fare. His humor was not improved when a surly Martian accidentally spilled his plate of stew and then wanted to fight him on account of it.

To a casual visitor the scene would have been one to impress itself on the memory—the long, metal, windowless hall with its arched ceiling; the subdued murmur of rain on the roof; the rows of hard-bitten faces. Fifty jaws champed methodically. Fifty pairs of eyes regarded the plates before them, vouchsafing the stranger scarcely a glance.

Was that indifference assumed? Crombie thought that men in such an isolated outpost would display a little more curiosity toward a stranger. He had introduced himself as an electronic expert sent to examine the conversion motors, and it seemed to him that he had been accepted rather too carelessly.

Covertly the officer studied Nusskopf, the hairy little man opposite him. Nusskopf was not a miner, the photograph-embellished service record had shown. He was the official hunter, whose duty it was to keep the huge saurians, that roamed the arctic zone from blundering into the mine area with consequent damage and confusion. And not only the comparatively harmless saurians, but other forms of life more inimical. Nusskopf had a bluff heartiness of manner, giving the impression of a man of great energy, which he extended even to the process of eating, as evidenced by the floating ribs—of a sort of Venerian horse—ranged around his plate. Crombie made a mental note that, as an official hunter, the man would be free to go about in any part of the mine workings, or in the surrounding wilderness, if he desired.

One after another he looked them over: Hoyt, Clasen, Murray, Nar Tol the Martian, Winterfeld, Ozdorf, another Martian, Arthur, Henesy, Mossman, and so on to the end of the table and back again. By the time the meal was over he had identified each man by his photograph and service record, and his efficient policeman's brain catalogued the information, but he failed to get a lead of real promise.

CROMBIE crossed the streaming pavement to the low, arched administration building and was admitted at once to the office of Lawrence De Maine, the general superintendent, second in command to Burgess. De Maine at least seemed to have stood the loss of a couple of Venerian servants fairly well. Stepping into his beautifully furnished private office out of that primitive world, Crombie helped himself to a long pale cigar out of the proffered box and relaxed comfortably into the deep cushions of a chair. He grinned at the smiling De Maine, noting the small, trim figure, the consummate sophistication of the fine features which missed being arrogant by a shade, the stiff little, cockily self-satisfied black mustache.

"Sorry to have missed you at breakfast," said De Maine easily. "The Old Man was somewhat upset, eh?"

"He was," Crombie drawled. "Most decidedly. Not that I blame him much. I tried to show him the evidence that I had to do it in self-defense, but when we got to the room it was gone."

De Maine nodded assent. "Tricky devils, these natives," he agreed. "I learned a long time ago to watch my step and never give them the first chance. Only, ah—" he smiled—"if we have a—ah—casualty, we aim not to let the Old Man see the remains. It was tough luck to have it happen right there in the residence."

"My old chief was with me in the Equatorial rebellion, and he knows the natives, so I don't expect any trouble, even if Burgess reports me, but I might have easier work if he'd be reasonable," said Crombie.

De Maine became grave. "It's a serious matter," he said earnestly. "It isn't only the financial loss, but the industries using the carbons have complained to the Interplanetary Congress and we're in danger of losing the concession on their representation that industry is being harmed by the shortage. Wherever the carbons are going, it's not on the market. There must be several bushels of them hidden somewhere—a stupendous fortune for the thief. In the meantime a group of Martian financiers are going after our concession and dividends are falling."

Crombie nodded. Fixing De Maine's dark eyes, he hurled a question at him—

"Confidentially, do you think Burgess knows anything about it?"

The superintendent flushed, looked uneasy.

"I couldn't say," he answered slowly. "I have always admired Mr. Burgess and would have to have strong evidence before I'd believe he had anything to do with the conspiracy. No, I believe he is innocent. But of course I realize that I am under suspicion too!" he exclaimed.

"Everybody is," was Crombie's frank rejoinder. "But you can save me a lot of trouble, De Maine, if you'll tell me this—does the shortage occur in the separator works or after you give carbons to Mr. Burgess?"

De Maine looked troubled.

"What I am about to tell you," he said slowly, "may get me into trouble, but you'll find it out anyway. The truth is, as you have intimated, the production of the carbons is as great as ever. I have been turning them over to the factor regularly, and have the receipts in full in my private file. He locks the carbons in the manganese-beryllium safe, each day's production in a little bag, and by the time the time lock permits opening the safe again, about sixty per cent of the carbons are gone, yet the seal of the bags is unbroken and the safe shows no sign of having been tampered with."

"Of the forty per cent remaining, is any taken in subsequent thefts?"

"No."

"That's a pretty thin story to tell the directors."

De Maine flushed. "I know it. Rather than making such a report we changed the records to correspond, hoping that we should be able to work out a solution."

"To put it plainly, you conspired with Burgess to cover up his apparent guilt."

"He isn't guilty! I saw him seal the bags and seal up the carbons, and the time lock absolutely prevents opening except at specified times."

"But just the same it was a sappy trick."

"I know it," De Maine admitted, a little nervously. "But you see"—he hesitated—"I'm engaged to Verna, his daughter."

"Oh," Crombie grunted. "It wouldn't be the first time it's been done, but it's foolish. This will probably cost you your job."

"Perhaps," De Maine agreed earnestly, "but would that solve the mystery? I admit I was a fool, but a man will do much to save the girl he loves from disgrace. Give me a chance, and perhaps I can get you the real thief. I still believe the Old Man is innocent."

"I won't go building planetoids," the officer promised in the idiom of the day. "But about those disappearing carbons—do you suppose there is some kind of fourth-dimensional monkey-business about it?"

De Maine grasped at the straw.

"There might be," he assented eagerly. "That would account for everything. But isn't that all pure speculation? I've never heard of the trick being actually done."

Crombie racked his brain. Shortly before leaving the earth he had taken a news-injection. The so-called micro-cosmic serum, taken from the brain of a professional news-reader and specially treated, had planted in his brain, among other facts, the memory of a recent scientific event. A young mathematician, delving in the ruins of ancient New York, had come across a well-preserved copy of a twentieth-century scientifiction magazine. Certain hints in a story therein had enabled him to perform the feat that had baffled scientists for ages—he had turned an orange inside out without breaking the shell.

"Perhaps," suggested the officer half hopefully, "someone temporarily turns the safe and bags inside out and helps himself to the contents."

"If he does, the process is invisible to us in the third dimension. We've been guarding the safe, but the carbons disappear just the same."

Their desultory conversation was interrupted by the vision that appeared in the suddenly opened doorway. Crombie did not need to be told that she was Verna Burgess. Nor did he need more than one guess to realize that she didn't care for him.

"How do?" she acknowledged the introduction stiffly. Her blue eyes took him in contemptuously. In the back of Crombie's brain a camera clicked; noting her lissomeness and grace triumphant under the stiff rain garments, her dark, heavy hair under a transparent cap, De Maine's sacrifice to shield her father seemed more natural. What else could a man do?

"How are you, Mr. Policeman?" she said pleasantly. "Have you killed any children or cripples since breakfast?"

Crombie turned without a word. Glancing at the infra-red periscope, he apparently became absorbed in the depressing, soggy image of the outside world, while he listened to the low-pitched conversation behind him. Like most eavesdroppers, he heard nothing complimentary, and so he stalked out into the tepid downpour.

CROMBIE put on a pair of goggles which were part of the standard Venerian equipment of the force. Although heavily shrouded in clouds, with an atmosphere surcharged with water vapors, which make it impossible for a man to see more than a hundred yards in any direction, Venus is rather richly supplied with light of the infra-red series. The harmonic goggles took advantage of the normally invisible infra-red, utilizing the long waves to set up shorter vibrations visible to the eye in a manner analogous in reverse order to the fluoroscope used by the ancients for X-rays. With their use Crombie was able to see a half-mile or more.

The mine was some hundreds of yards from the walled compound which contained the administration, residence and barracks structures. Leaving the firm, paved court, Crombie was swallowed up immediately by a wilderness so primitive, so dismal and terrifying that even he, an old campaigner, felt a vague uneasiness. There was no such thing as solid ground. On either side of the wide "corduroy" road, constructed of tall palm trunks laid side by side, was quaking muskeg. Woe to the man who lost the road or the occasional outcroppings of solid rock that provided the only means of ground travel!

Vast ferns, towering a hundred feet in the air, drooped over the man-made lane, shutting out the sullen sky. Through the darkness, difficult even for the infra-red rays to penetrate, came the patter and drip of perpetual rain, interspersed with the barks, bellows and grunts of harmless beasts that were tolerated near the mines. Grotesque caricatures of turtles with huge hornbills splashed off the comparative dryness of the road and fled noisily into the odorous fog. Once the officer's way was barred by a vague shape that sat on its haunches in the road and browsed the luscious, drooping top of a tree with long, thick, fleshy leaves. It squealed in terror as the D'Arsonval current singed its flesh, and its crashing flight roused a hideous bedlam that did not subside until long after Crombie had been admitted to the squat, rambling building that housed the machinery at the mine entrance. As he entered the door he felt a blast of frigid air that was, after his sweating journey, both welcome and disquieting.

Crombie stared curiously. This was not what he had expected, and the chief engineer, a highly developed Eurasian, volunteered information.

"You surprised, not? You expect see great pit—big hole in ground? Yes? Like they mined black carbons on Earth? Maybe this look crazy, hey? Well, crazy like dibdar, maybe. Ha, ha! That a joke. The dibdar, he small, but he the smartest little animal fellow on Venus. Well, this the only way get carbons on Venus. Big hole fill with water right quick all of a sudden, so we leave top ground. Freeze it! Froze hard as rock. Men work under roof frozen mud. Walls frozen; pillars frozen. Make sort of cavern, see? Underneath cavern we make 'nother—eh—sort basement, see? Ha, ha!"

Crombie left the ha-haing engineer and stepped into one of the magnetic elevators, touched a button that would cause him to be deposited at the floor level of the first cavern, five hundred feet below. As he started gently to descend, he saw a negro laborer, carrying a crowbar, come hurrying across the room as if trying to get into the elevator before it went down, brushing aside several Venerian helpers like so many straws. The negro stumbled clumsily and sprawled on the floor. The crowbar flew from his hand, straight and true as a javelin, into the copper maze of the electrical selector box. Instantly there was a blinding flash, the scream of a siren, and Crombie felt the floor drop from under him. The cage was falling, free and unimpeded, down a hole, to end in total destruction fifteen miles down.

In those roaring times, when the solar system still presented real frontiers for the hardy adventurer to batter down, a man could not be a member of the Interplanetary Flying Police without facing death and danger a thousand times. Crombie was more or less inured to it. Yet, as he hurtled helplessly down that hole, he oozed sweat at every pore. To be smashed to a pulp in that fiendish muck was no way for a man to die!

He must have fallen at least a mile before the swift flashes of brightly lighted caverns ceased, and he continued to drop in darkness. The spaces below had been thoroughly cleaned out, and were merely kept in their frozen condition to support those above, which formed the nucleus for a system of lateral excavations extending for miles in all directions under roofs of frozen mud.

Another eternity etched itself on his mind, though it must have been a matter of only a few seconds. He was now dropping, as it seemed, as fast as a bullet. The rollers of the guiding rails pounded a mad rhythm. He was sick—so sick he believed he would die before he hit bottom. And then it happened.

With a demoniacal shriek the rollers bit into their bearings. A violent lurch hurled Crombie to the bottom of the car. Again the car dropped, and again it was seized. The guides grew red-hot and melted with a trail like a meteorite's. Mud began to spray through the gratings. They were scraping the sides. For economy of refrigeration the abandoned workings had been allowed to get too warm. The mud and clay had softened, squeezing the elevator shaft out of line. The deceleration was now violent and sustained. From above came a rush of air and a violent rumble. A mass of mud was falling down. For an agonizing moment Crombie thought he was going to be buried alive, but the avalanche brushed by the car, muttering and mumbling as it were, to the infernal depths below. Suddenly the car left the guides altogether, but its appalling speed had been checked. It plopped harmlessly into the soft mud.

Silence and darkness—save for the drip-drip of water. Scrambling out of the cage that had nearly been his coffin, the officer threw his flashlight, a powerful type using the newly discovered rare mineral vorium as a

disintegrating agent on magnesium, about his prison. He found himself on top of a sticky talus of clay that had been dislodged from the side of the bore. Overhead a very dim light was visible—possibly about three miles up. Below, a sickening chasm. There was apparently no way out except the elevator shaft.

Crombie hoped for no rescue. He knew that the wrecking of the control was done deliberately to assassinate him. He summed up his advantage:

Those above thought him dead.

His disadvantage: a climb up that frightful chimney along the rails. He started.

AN HOUR later he had climbed 500 feet, to the floor of the cavern next above. Here he had a bit of luck. He found an abandoned conduit for refrigerating pipes and electric cables, with the metal ladder still intact.

In another hour his hands were swollen and raw. His shoes had been cut to shreds and he was climbing on bare feet. But he was sustained by the knowledge that the pipes were again very cold, covered with ice. This meant that he was approaching the zone of active work.

It was step, haul, grunt, push, curse. Every movement was agony. Every foot gained was torture. His head was reeling. Crombie knew he must soon relax and fall. With desperate effort he crawled into a lateral conduit, inched his way along for a short distance. Temporarily safe, he fainted.

Crombie must have been unconscious in that inky blackness for several hours. When he awakened, it was because he heard his name spoken. Hardly a foot from where he lay was a square opening, dimly outlined by a weak light beyond. Had he continued his blind squirming he would have fallen several feet to the floor of the cavern into which he was looking. He crept a little closer to the opening and looked out. He received a shock of surprise when he saw De Maine; barely repressed an exclamation of joy. He was glad for that instinctive repression when De Maine began to speak:

"There's no use deluding ourselves, man. Just because we got rid of Crombie doesn't mean we're safe. The Interplanetary Flyers will send another man, and if we get *him*——

"——they'll send another, and in the end they'll get *us*. That means *the tube!*"

He made an expressive gesture, only too clear to the others. They visualized the long, sad walk from the death cell. They saw themselves thrust into the vitreous tube, a dull, momentary glow of the surrounding helix——

And a second later the ashes would be ready for delivery to the relatives. A negro—the one who had thrown the crow-bar—gave a shuddering groan.

"Oh Gawd! Oh Gawd!" he wailed.

"Shut up! Why not try other fella! Ha, ha! That's joke. We're down, you know—closer other fella! Ha, ha!"

"Don't be fools!" De Maine snapped. "I'll take care of you—all of you. The carbons are already in my ovoid, the *Spittin' Devil*, except for this week's haul. We'll hop off for Mars, where I have friends who'll take care of us. Then a little plastic surgery, and we're fixed for life."

"Just where is your ship, if I may ask?" inquired Hanford, with a snaggly-toothed grin.

"Boil that!" De Maine said sharply. "Think I'm a fool? What'd keep you from stealing the ship on your own?"

"Aw!" a sallow-faced individual intervened. "We wouldn't have no place to go. We gotta have you anyway, and you're bright enough to have the ship locked, I guess."

De Maine considered. "You'd better go and wait for me at the ship at that. I'll tell you where it is: Follow the corduroy until you come to the green outcropping. Follow that west until you come to the beach of the Endless Sea. The *Spittin' Devil* is nestled under Despair Rock. And no funny business. I've got something to attend to first, but the man who isn't there and ready when I come gets left."

"We'll be there!" they assured him in jovial chorus. They had been De Maine's pawns in this business, and among themselves they had discussed the possibility of being double-crossed. The fact that their Venerian coplotters were being left to their fate bothered them not at all. Let the natives go back to the jungle!

Crombie was called upon to act. He rejected the idea of covering them with his projector and marching them out as his prisoners. There were at least ten men there, including the hunter. Several were armed. This meant that Crombie would be seared to death before he could accomplish anything, because the men were not all within reach of an instantaneous sweep of the officer's weapon. Or the survivors could play safe and gas him to death in the conduit.

Desperate measures were necessary. The men were on their way to a large freight elevator near by. Crombie dropped quietly out of the hole, suppressing a groan. He was thankful that the emission tube at the top of the abandoned cavern was near the end of its run and gave little life. He squirmed through shallow depressions in the floor, heedless of the half frozen mud, and so gained the rear of the metal latticework encasing the elevator shaft. De Maine adjusted the inductances and the cage began its ascent slowly.

In a few seconds the floor of the cage was on a level with the officer's eyes. Quickly he squeezed through the latticework, shuddering as he tried to forget the yawning hole before him. Calling on his tortured muscles for their last ounce of energy he leaped into space——

For a harrowing moment it seemed that his straining fingers must miss the edge of the floor truss. But they caught—slipped. The vortical flux was taking hold of the casing rings and the acceleration upward put a cruel strain on the desperate man underneath. In a minute or two, however, the induction constant was reached and the strain on Crombie was somewhat relieved. He managed to get a firm hold with both his hands and so held on for the rest of the interminable ascent.

The men clattered out of the cage and out of the building, and Crombie worked his way to the end of the truss. He was barely able to reach a member of the elevator casing and so to pull his way to safety.

But Crombie had been hasty in assuming that all the men had left the building. As he wormed his way thankfully to solid footing again, he was greeted with a shout, and a yellow figure fled from the scene, ruthlessly trampling a frail Venerian who was oiling a conveyor. The creature threshed about under the machine which did the heavy labor he was incapable of doing and died.

(*Continued on page* 758)

Solarite

By John W. Campbell, Jr.

Author of "When the Atoms Failed," "Piracy Preferred," etc.

THE lights of the great Transcontinental Airport were blazing in cheering splendor. Out there in the center of the broad field a dozen men were silhouetted in the white brilliance, looking up at the sky, where the stars winked cold and clear on the jet background of the frosty night. A slim crescent of the moon showed in the west, a thin sickle of light that in no way dimmed the cold flame of the brilliant stars.

There seemed one now that moved across the motionless field of far-off suns, one that shot toward the airport in a long, swift curve. The men on the broad plane murmured and pointed up at it as it swept low over the blazing lights of New York. Lower it was now, the towering city behind it. Half a mile into the air the buildings rose in shining glory of colored tile that shone brightly in the sweeping play of ever-changing colored floodlights, while above, like long fingers of crimson and green and gold, every color of the rainbow—the long beams of the spotlights reached out into the night.

One of them picked out the descending machine, and it suddenly leaped out of the darkness as a shining, streamlined cylinder, a cylinder with a great halo of blue fire, as the beam of the spotlight set it off from the jet black night.

In an instant the ship was vast before the eyes of the waiting men, and it had landed gently on the field, was rolling smoothly, gracefully toward them.

Two dozen men climbed from the great ship, shivering in the icy blast that swept across the field, spoke a moment with the men on the field, then climbed quickly into the grateful warmth of the waiting field car. In a moment they were moving rapidly toward the lights of the field house, half a mile off.

Behind them a huge ship leapt straight into the air, then suddenly pointed its nose up at an angle of thirty degrees and shot high into the air at an unbelievable speed. In an instant it was gone.

At the field house the party was breaking up rapidly.

"We want to thank you, President Morey, for your demonstration of the new ship tonight. I am sure we all appreciate the kindness you have shown the press, and you, Dr. Arcot, for answering our many questions about the new ship." The reporters were filing out quickly now, anxious to get the news into the morning editions, for it was after one o'clock now. Each was taking a small slip of paper from the attendant standing at the exit, the official statement of the company. At last all had left but the six men who were responsible for this wonderful new machine.

This night had witnessed the official demonstration of the first of the Arcot-Morey molecular motion ships. Small as this ship was, compared to the titanic ships that were to come, yet it had a passenger capacity of over three thousand, as great as that of any of the existing winged planes, and its speed was terrifically greater. The trip from the west coast to the eastern had been made in less than one hour. At a speed close to one mile a second the great ship had shot through the thin air, twenty-five miles above the dark earth. Propelled and sustained by the energy of heat, it needed no wings and could attain terrific speed. In all matter the molecules are in rapid motion, the motion being responsible for their temperature, but this motion is ordinarily in every direction, the uncountable billions of molecules each moving in a different direction, the law of averages balances out their individual motions, and they make no progress. Just four months ago Arcot, Junior, working with Morey, Junior, had discovered that very high frequency electrical vibrations could be made to affect these molecules and make them all move in the same direction. If all the molecules of a piece of matter move in the same direction, obviously the entire body is moving in that direction.

In this car a huge bar of metal was so affected, and its molecules all tried to move forward, but the mass of the car held it back, and the molecules were slowed down. Slow-moving molecules

ALL roads lead to tales of interplanetary travel, it seems. Our young scientist-author could hardly be expected to confine himself forever strictly to our own comparatively tiny planet. But Mr. Campbell Jr. has the faculty of exercising his imagination, at the same time keeping it strictly within the bounds of present-day scientific knowledge, and we must therefore concede to him the right of flights off into space, beyond our Earth—even beyond the universe. Those of our readers who read this author's previous contributions, know that they can expect a thrilling, exciting adventure tale full of new and ingenious scientific ideas. And these readers will not be disappointed.

Illustrated by MOREY

¶ *Streaming from them, in a mighty blast of incandescent gas, the atomic hydrogen was shooting out in a mighty column.*

mean a low temperature, and at once these molecules absorbed heat from the molecules of the surrounding air, and swiftly the great car was accelerated. Similar devices steered the great ship and another series of such power units directed upward held it motionless vertically, or made it rise or sink.

No matter what the speed of the ship, the molecules were always trying to go faster, for who can say how fast the molecules of the earth's atmosphere are moving? They have their individual motions; in addition the earth spins on its axis, the entire planet revolves about the sun, while the whole system moves on through space at ten miles a second. Thus there was no limit but the speed of light to the velocity that the car could attain.

This invention had been turned over to the Transcontinental Air lines, whose president was the father of Morey, Junior, the co-inventor of the new apparatus.

ARCOT was a theoretical physicist but Morey was a mathematician, and it was with his aid that Arcot was able to get the mathematical equation of his ideas. Arcot seemed always to be able to sense the solution to the problem with a brilliant leap of genius, the general answer, but it was Morey's careful mathematical proof, following and amplifying the ideas Arcot outlined, that led to their successful operation.

"Arcot," said Morey, Senior, after the pressmen had left the room, "as President of this company I certainly want to thank you for the tremendous thing you have given us to use. As your friend and as a citizen, I want to thank you for the wonderful weapon. War is impossible.

"You have 'sold' us this machine—but how can we repay you? Before this, time and time again, you have sold us your different machines, the ideas that have made it possible for our line to attain its present high position in the world transportation network. All you have ever accepted is the laboratory you use, its upkeep, and a small amount annually. What can we do to show our appreciation this time?"

"Why," answered Arcot smiling broadly, "you have not stated the terms correctly. Legally I have the laboratory in which to work, which your Company maintains, and whatever amount of personal income I wish to draw. There isn't even a 'within reason' clause in it. As a matter of fact, it should read that I have a fully equipped lab to putter around in, all the time I want to amuse myself, all the money I want—and the laboratory to amuse myself in. What more could I want?"

"I suppose that is all true—but when you draw only about six thousand a year for personal expenses—why a good clerk could get that—and you, admittedly the most brilliant physicist of the earth, are satisfied! I don't feel that we are paying you properly!"

"But the clerk might have a family—I haven't—how could I use the money if I did draw more? But you can repay me this time," added Arcot more seriously, "for this latest thing has made a new thing possible. I have always wanted to be able to visit other planets—it has been the dream of many a scientist for the last three centuries. This machine has made it possible. If you are willing—we could start by the spring of 2117. We have all been busy working on that ship; finally the first of the molecular ships is finished. I want to start work on the first interplanetary ship. For this I will need to have Fuller's help. Now that he has finished his work in designing that ship—I think he will be willing to help on my problem—he said so this evening. The proposition will be expensive, of course, and that is where I must ask you to help me. I think, however, that it may be a paying proposition, at that, for there will no doubt be many new sources of materials on the other planets."

They had walked out to the shed where Arcot's private molecular motion car stood, the first machine that the world had ever seen, that used the heat of the sun to drive it and maintain it. Thoughtfully the president of the great Transcontinental Lines looked up at it. Small it was compared with the great machine that had just brought them east, but of the same swift type. It was a thing of graceful beauty here even as it rested on the ground, its long curving streamlines giving it wonderful grace. The men stood in thoughtful silence for a minute—the young men eager to hear the verdict of their prospective backer.

"If it were the money you asked for, Arcot, I would gladly give you double the sum, but there is only one thing that worries me. I know perfectly well that if you do go, my son will go with you, and Fuller and Wade will naturally go too. Each of you has come to mean a lot to me. You and Fuller have known my son since college days. I have known Wade but three months, but every day I grow to like him more. There is no denying the fact that any such trip is a terrifically dangerous proposition. But if you were lost, there would be more than my personal loss. We would lose some of the most brilliant men on earth. You, for instance, are conceded as being the world's most brilliant physicist; Fuller is one of the greatest designing engineers; Wade is rapidly rising into prominence as a chemist and as a physicist; and my son is certainly a good mathematician.

"But you men should know how to get out of scrapes just that much better. Certainly there are few men on earth who would not be willing to back such a group of men—or any one of you, for that matter! I will back your trip! But although I know that Arcot and my son can handle a gun fairly well, I don't know so much about Wade and Fuller. What experience have you two had?"

"I think my greatest recommendation will be as cook on the trip, Mr. Morey. I have done the cooking on a number of camping trips and I think that food has a considerable effect on the success of an expedition. I can shoot a bit, too," said Fuller.

"I come from the west, and have had a good bit of fun in the Rockies; there are still some mountain lions and some deer there. I also have a speaking acquaintance with the new gun, which Arcot developed in connection with his molecular motion. But there is so little you know about me—and most of it bad—I don't see how I really get in on this opportunity—but I certainly don't intend to keep the old boy knocking—I am with you, since I am invited!"

Wade had been known as the Pirate—and it was through Arcot's efforts that he had finally been cured. It was found that he had been suffering from kleptomaniacy induced by a blood clot in the brain, and after a simple operation, performed by one of the leading surgeons of the country, he had been restored to normal, as one of the world's foremost scientists. He had at once been invited to join Arcot in his lab, to keep, as

Arcot explained, all possible competition in the family! Since then Wade had proved himself well worthy of his position.

"You're invited all right, Wade—on one condition—that you just forget all about what happened under the influence of the blood-clot.

"Then you will definitely support us?" Arcot was jubilant.

"Yes, I think I will," replied Morey, Senior, seriously, "for I think it is worth doing. There may be great advantages coming from the trip."

The tremendous advantages that actually did come from the trip, Mr. Morey could not, of course, foresee, but we certainly must be thankful that he did decide to back this trip.

"I want to thank you for that, Mr. Morey—wait till Dad gets back from that European conference—he can help us too——!" Arcot had evidently been making his plans for the trip!

THE young men climbed into the ship, to start for their apartment. Arcot was piloting, and out into the cold night air the ship rode easily, then up, up, up—up through the dull atmosphere, till they hung fifty miles up, on the outer verge of the airy blanket. Here in space they looked out in silent thought at the magnificent blazing stars of space. Here, where the dust-laden air could no longer mask their true colors, the stars shone unwinkingly, steadily, and in a glory that no man has ever seen, save thus far out in space. No longer were they all the same scintillating blue, all alike, as we see them from earth, but here they shone in a wonderous riot of color, as varied and as beautiful as the display of colored floodlights in some great city. They were tiny pinpoints of brilliant color, they were red, and green, and orange; there were yellow ones and deep blue ones—they shone in intense brightness, and each was tiny beyond comprehension; here, with no atmosphere to diffuse their brilliance, each was tiny to the vanishing point, mere points of light on a soft black that has no equal, the utter black of space, where there is nothing visible. Here no air blurred the stars to great pointed splotches.

Then slowly Arcot let the machine settle to the blazing city miles below.

"I love to go out there and look at those cold, pinpoint lights; they seem to draw me out there to investigate—the lure of other worlds. There always has come a sense of unfulfilled longing—the desire to go—and never before have I been able to hope to. Now—I will be out there by next spring!" Arcot paused and looked up at the mighty field of stars that arched over his head to be lost on either horizon. It was a wonderful night!

"Where shall we go first, Dick?" asked Wade softly as he gazed out at the far-off suns of space. One wanted to talk softly here—there was a mighty grandeur about it that lured, yet oppressed one.

"I have thought of that for the last four months. I have looked up statistics, and now that it is decided that we will start, we must decide where we are to go.

"Of course we cannot leave the solar system. There are not many places we can go, let us eliminate them one by one, beginning with the sun and working out.

"Obviously we will not go to the sun. Mercury circles the sun at a distance of 36,000,000 miles. It is the smallest of the major planets—only slightly larger than the moon, and very like it in many ways. It is easy to eliminate that—for it revolves always with the same face to the sun. The tremendous tidal action of the sun has through the ages, slowed Mercury's axial the sun, and once in those eighty-eight days it turns on rotation till it merely keeps the same face toward the sun. Once every eighty-eight days it revolves about its axis. Thus always it faces the sun on one side and space with the other. One side is as hot and bleak as a lava bed, the other as cold as far off Neptune.

"Again it is too small to maintain an atmosphere. It has neither air nor water. Were we to visit it we would find no life, and could not leave the ship.

"This also applies to the moon, so thus we eliminate two possibilities and into the bargain I might say that the moon is so readily investigated telescopically that it scarcely repays investigation in this way.

"Next out from the sun is Venus—the beautiful planet. Venus gets twice the radiation from the sun that our earth does, and she is nearly the same size, her diameter is 7,700 miles while that of the earth is 7,900. The entire planet is coated with a perpetual layer of heavy clouds, that has never broken but once since men have observed it. These clouds mean that it will reflect a tremendous amount of light, and so it does. In fact so brilliant is the planet from our earth that it can be seen at midday, when in the right position, and on moonless nights, will cast a shadow.

"The mass is about 82 per cent. that of the earth, so that the gravitational force will be about 85 per cent, due to the lesser radius. Thus Wade, who weighs almost exactly 200, will weigh about 170 there.

"The very clouds that hide the surface from us, show that the planet has a deep atmosphere. Measurements, made of the amount of heat radiated from the night side of the planet as long ago as 1928 showed that the amount of heat radiated required that the planet have a fairly short day. The absence of markings in the smooth layer of clouds makes it impossible to know the length of the day. The only time there was any break in the clouds was about four centuries ago, when two men observed the break, which lasted several days, and each got a result for the length of the day, but the results were rather surprising! One was twenty-three hours, and the other twenty-four *days*. They can, however, be reconciled. If the one man observed the break in the clouds once each night that it lasted, at the same hour, he would see that, in twenty-four hours, the twenty-three-hour planet would have made one turn, and a bit more. In twenty-four days he would have found that it was again as it was the first night, for the planet would have gained one revolution on the earth. There are obviously two possible interpretations.

"Venus is the planet of mystery—most like the earth, it is ever shrouded in clouds.

"It is but 67,000,000 miles from the sun, and we are particularly fortunate in that next spring it will be in conjunction with the earth, and we will be but about thirty-five million miles from it.

"As you see I rather favor Venus—it is a mystery, and we could leave the car to explore that planet.

"Mars is next to be considered. It is now at superior conjunction, or about two hundred and thirty million miles off. I think that eliminates it for the present, and into the bargain, no human being could live on that planet by any stretch of the imagination.

In daytime he would almost fry, and at night freeze solid. That life might develop there is certainly conceivable, but we would not be able to explore it. It is also too small to have a very dense atmosphere.

"Jupiter, the giant of the Solar system is next. Did you know that at one time, people on a planet circling one of the nearer stars would have said the sun was a double star? When Jupiter was first thrown off from the sun it was a mighty glowing sea of fire, of about one one-hundredth the brilliance of the sun. This would certainly be recorded as a double star. Jupiter, whose mass is about one one-thousandth that of the sun, is big enough to swing it a bit. The center of gravity of the solar system is not in the center of the sun, but leans toward Jupiter quite appreciably.

"Jupiter has so great a mass that the gravity would be fatal, but the quick rotation so reduces it, by centrifugal force, that a man might be able to stand it. Though Jupiter measures a quarter of a million miles around at the Equator, it spins on its axis once every ten hours—or really a bit less.

"Jupiter is certainly very interesting in itself, but there are even more interesting things about it, for it is, as I said, a sort of a second, smaller sun in the solar system, a cold sun now it is true, but still a sun. Like the greater sun, it has a system of planets, more or less extensive. Some, indeed, are larger than some of the planets of the sun. Both Mercury and Mars are smaller than Ganymede, the largest of Jupiter's satellites. This might be well worth exploring, but it too has such a small size that there is no great atmosphere. We can not leave the car, and there is no great joy in exploring a planet unless you can really get out and stand upon its surface. Of course we can use altitude suits, and so make our explorations, but the temperature is so low, and the air so rare, we would be sure to need oxygen tanks and heaters.

"The outer planets all have one big difficulty—there are so many asteroids in the ring of asteroids, we will be greatly menaced by them. And into the bargain they are so far away that I think we had best wait till later trips. That leaves the choice really between Mars, Venus, and Mercury. The choice as far as I see it is not very great. What do you vote?"

"Well, I quite agree with you Arcot—it is more fun to explore an unknown planet than one that can be observed telescopically. I vote *Venus,*" said Morey. Each of the others agreed with Morey that Venus was the logical choice.

By this time the machine had sunk to the roof of their apartment, and the men disembarked and entered. The next day they were to start the actual work of designing the car!

IT was late the next morning when they began their work, for it had been well after two when they finally reached the apartment. But when they had begun the job, it went forward steadily till the light faded that evening. So absorbed were they that noon and lunch hour passed unnoticed.

"When we start this work," Arcot had begun, "we want to first design the ship for the conditions we expect to meet, and for the maximum convenience and safety. I believe I have thought of this trip longer than the rest of you, and for this reason I will give my ideas of what will give the greatest safety.

"Venus is probably a younger planet than the earth. It is far nearer the sun than we, and gets twice the heat that the earth does. In the long-gone time when the planets were cooling I believe that Venus required far longer than earth, for the inpouring heat would tend to prevent its cooling. I imagine Venus today as a mighty world of rolling oceans of water, that beats on rugged shores of rocky islands, small spots of land in the vast watery area, while frequent fogs and mists swirl about the low hills, and through it all a tremendous oppressing heat burns down through the thick clouds. The surface temperature is probably about 150 degrees Fahrenheit.

"There is little land, for Venus has no moon, and hence there has been no great tendency for the water to collect in any one place. The gigantic hollow that was left when the moon was torn free of earth made a great basin that caught the water, and left vast areas of land dry.

"On Venus there was no such basin, and there is probably little dry land.

"What life has developed must be largely aquatic, and the land is probably far behind in evolution. Then again—Venus is the planet of mystery—we can only guess. But we do know what things we are going to need and what we will need to cross space.

"Of course the main driving force will be the power units. These will get their energy from the rays of the sun by absorbing them in a great copper disc about twelve feet in diameter—the ship will have to be more of a disc than a cylinder. I think a ship a hundred and eighty feet long, fifty feet wide, and twenty feet deep will be about the best dimensions. The power units will be strung along the top of the ship in double rows—one down each side of the roof. In the middle of the roof will be a series of fused quartz windows, opening into a large room just under the outer shell of the ship. We will obviously need some source of power to activate the power tubes that run the molecular motion-power units. We will have a generator run by molecular motion-power units in here, absorbing its heat from the atmosphere in this room. The air will be heated by the rays of the sun of course, and in this way we will get all our power from the sun itself.

"Lest this absorption of energy result in making the ship too cool, due to the radiation of the other side away from the sun, we will polish it, and thus reduce the unlighted side's radiation.

"The power units will not be able to steer us in space, for they will all be on the roof, and those on the sides, which will steer us in the atmosphere by the usual method, will be unable to get the sun's power; they will be shaded. For this steering in space, we will use atomic hydrogen rockets, storing the atomic gas by the Wade method in huge tanks in the hold. We will also have a battery down there for starting the generator and for emergencies. The air will be swept free of carbon dioxide by bubbling it through water under very high pressure, when the highly soluble carbon dioxide will remain in solution. It will be easy to keep the air clean and moist in this way, and at the same time remove the carbon dioxide into space. The water can, of course, be freed of the gas, and used again. Since we will have plenty of power, this system will be less bulky than the chemical absorption method, and more enduring. We will carry an emergency chemical plant however—

"The oxygen will be stored under very high pressure in tanks distributed all over the ship—anywhere so they will fill-in loose space that has no other use. We will carry a six months' supply. We will also carry an electrolysis outfit for turning water into oxygen and hydrogen. We can use the heat of Venus' atmosphere to run the generator and break up the water, then compress it and recharge the tanks, while the hydrogen will be broken into atoms, and used to recharge the atomic hydrogen tanks.

"The most important single piece of equipment will be the apparatus for avoiding meteorites. There is really no tremendous number of them at this season, but we must be protected against them—for it only takes one of them to finish us! The idea I had in mind was to take advantage of the usual form of radio altimeter, depending on the reflection of the radio wave from any material object. We can have a series of them scattered all about the ship—each pointing in a different direction. If anything comes within a hundred miles of us the altimeter covering that sector will at once set automatic machinery in operation, and the rockets will shoot the ship out of the path of the meteor. We will need greater accelerations than the power units can give us in space. Of course, in the air the power units are very powerful, but in space the sun will not supply heat very fast. The absorption discs will be made to lie flat to the side of the ship, of course, and painted dull black to absorb every bit of energy. In the air they will be fully efficient and have very little resistance, for they will cut the air like a knife."

All that day Arcot and the other men discussed the various pieces of apparatus they would need, and toward evening Fuller began to draw rough sketches of the different machines, the mechanism that had been agreed upon.

The next day, toward evening, they had really solved the rough details of the ship, but now began the greater task of calculating the stresses and the power factors.

"We won't need any tremendous strength for the ship while it is in space, for then there will be little strain on it. It will be weightless from the start, and the gentle acceleration will not strain it in the least, but we must have strength, so that it can maneuver in the atmosphere.

"Remember, when we leave earth we will do it by centrifugal force, for I can make much better speed in the atmosphere where there is plenty of power to draw on, than in space where I am dependent on the slow absorption of the sun's energy. We will start about the earth, forming an orbit just within the atmosphere, that is going at five miles a second. Then gradually we can increase the speed to about ten miles a second. At that speed the ship will tend to fly off the earth under its own centrifugal force; earth's gravity will no longer hold it. We will have to use the power units working downward to keep it from flying into space before we are ready. Then when we do release it, it will be entirely free of the earth, and no more work will be needed to overcome the earth's pull.

"We are, on the earth, going 19 miles a second about the sun, so in space we would still be going at that rate, and would remain a captive of the mighty sun, rotating in the earth's orbit, yet not attached to earth, for any body rotating at 19 miles a second about the sun will automatically fall into the earth's orbit.

"Venus rotates at 12 miles a second. To reach Venus we will not start toward it, but will use our acceleration *away* from it. This will slow the car in its rotation about the sun, and it will fall toward the center of attraction. The fall will, however, restore some of its speed, and a new orbit will be formed. This process will be continued, falling from orbit to orbit, till we at last fall into the orbit of Venus, and then we will let Venus catch us in its gravity, and we will fall to the planet. A similar process, reversed, would carry us to Mars. If we were to force the car toward the sun by means of the power units without slowing down its rotational speed, the moment we released the power, the ship would bounce back to the earth's orbit like a ball on the end of a rubber band!

"When we leave earth—at ten miles a second, as I said—we will shoot off in the direction that will oppose the earth's movement, thus reducing our orbital speed of 10 miles a second, and causing us to fall in toward the sun. Of course we will gain speed again by the fall, so we will not fall beyond the orbit we want, but the trip will be tremendously shortened, and the higher the speed of leaving the earth, the quicker the trip." This came from Arcot.

THE plans continued with exasperating slowness. The details of the work were amazingly complex, for all the machines were totally new. It was close to a week before even the power units could be ordered and the first work on the ship started. After that the orders for materials left the office daily. Still, it was late in November before the last order was sent out. Now they must begin work on other parts of the expedition—food supplies and the standard parts of the equipment. Also Arcot had decided to make a special ventilated suit. This was to make use of a small molecular motion director apparatus to cool the air, and blow it through the suit. The energy extracted by the apparatus in blowing the air about would cool it to a more comfortable temperature, for Arcot expected to find the temperature about 150 degrees, and so moist as to be unbearable, and eventually fatal to men of earth. The apparatus consisted of a small compressed air-driven generator and a power tube bank that could be carried on the back. It weighed, complete, about fifty pounds, but due to the lesser gravity of Venus this would be reduced to about 43 pounds, and that was but about fifteen pounds more than the difference that gravity would make on the weights of the men themselves.

"Arcot," Wade had said when he saw the apparatus completed and the testing machine ready, "I was just noticing how similar that is to the portable invisibility apparatus I developed as the *Pirate*. I wonder if it might not be handy at times to be invisible—we could incorporate that with a slight change. It would not add more than five pounds, and those tubes you are using are easily strong enough to carry the extra load."

The invisibility apparatus Wade mentioned was the electro-induction apparatus he had invented that past summer, and by which he had been able to enter the planes of The Transcontinental Lines unseen. It had been known that X-Rays penetrated metal by setting the molecules in rapid oscillation in step with themselves, then passing readily through the vibrating molecules. Wade had applied this principle to light—but in order

to set up the vibration that made all substances perfectly transparent, he had used very short radio waves; the electrostatic conditions would set the molecules in vibration, and at once they were made perfectly transparent. The invisibility was almost perfect, and when the ship was in the air, it was utterly impossible to see it.

"Great idea, Wade," said Arcot. "It might be very useful if we met some savages. The disappearance stunt would make us gods or something. And now that you mention it, I think we can install the apparatus in the ship. It will require almost no power, and might save our lives some time."

Undoubtedly it was this simple suggestion of Wade's that led to the eventual salvation, not only of the expedition itself, but of two worlds.

The work was going on steadily now at the great Transcontinental Shops where the machine was being made. The manufacture was being kept as much of a secret as possible, for Arcot feared the interference of the crowds that would be sure to collect, and since the ships directly adjoined the air field, it meant that there would be helicopters buzzing about the Transatlantic and Transcontinental planes.

The work to be done required the most careful manipulation and workmanship, for one defect in space meant death. The trip would take them six days, and in the three days before they could reach either planet, much might happen to a crippled ship.

To the men who were making the trip, the waiting seemed most exasperating, and they spent the days before they could begin the installation of the electrical apparatus in the completed hull in purchasing the necessary standard equipment, the standard coils, tubes, condensers, the canned food supplies, clothes, everything that they could imagine as of possible utility. They were making the ship with a great deal of empty storage space, for Arcot hoped the trip would be a financial success.

The crust of the earth, that part of the earth that man can hope to use as sources of supplies, is built up of ninety-two elements. But of these ninety-two, seven account for more than 98 per cent of the material, one alone, oxygen, accounts for 50 per cent, and after oxygen comes silicon, which represents 28 per cent. The first seven elements are oxygen, silicon, aluminum, iron, calcium, magnesium, sodium and potassium. Of these seven elements, each one of which represents a higher percentage of the material than all the other eighty-five elements combined, there are three that man can use as building materials. Aluminum, iron, and magnesium are useful metals, but quartz, silicon dioxide, is the only other useful building material obtainable from that list. And not all of those 92 had been discovered in 2116.

These small percentages of copper, zinc, lead, chromium, tungsten, beryllium, manganese, molybdenum, silver, platinum, and vanadium meant a starvation of metals. Platinum was exhausted already; iridium was gone; copper was nearly exhausted; silver was becoming more and more important as the other metals became rare; lead was now so rare that it was cheaper to line acid vats with silver than with lead.

But there were many uses for which the metals were irreplaceable. Arcot hoped, with reason, that Venus might yield vast new sources of these nigh-exhausted metals. Our civilization is founded on metals, and it is only through them that it can remain strong. We must get new sources, or civilization will be lost. Arcot hoped to find such sources on Venus, and the ship was prepared to carry back samples of the ones found.

On the outward trip some of this space would be filled with the many things that they would consume *en route*. In addition they were carrying a great many spare parts, spare tubes, spare power units, spare condensers—a thousand and one odd parts. Arcot intended that they should be able to make an entire new power switchboard and motion director unit if anything should go wrong, and he certainly had all the apparatus. As we know now, it was well he provided it.

At last came the day when the last connection had been soldered, and the last joint welded. The atomic hydrogen tanks had been filled, and under the ship's own power the oxygen tanks were filled and the battery was charged. They were ready for a test flight!

The great ship was standing on the floor of the shed now, waiting the start.

"Oh fellows—come here a minute!" Arcot called to the other members of the party. "I want to show you something."

THE other men walked quickly to the bow where Arcot was standing, and followed the line of his vision, looking in wonder to see that everything was right. They turned curiously to him, and he pulled from his coat a large glass bottle, sealed shut.

"What's that for?" asked Wade curiously.

"We are about to start on the first cruise, and I have been wondering if it isn't time we gave the machine a name?"

"Great—I had been thinking of that too—what are we going to name her?"

"Well," said Arcot, "I had been thinking of *Alexander*—he longed for other worlds to conquer!"

"That's a good one—I have been thinking of naming it too—I guess we all have—but I was thinking of *Santa Maria*—the first ship to discover the New World," suggested Morey.

"I was thinking more of its home," said Wade. "I was thinking of calling it *Terrestrian*.

"Well—it's your turn, Fuller—you designed it. What do you suggest for your masterpiece?" asked Arcot.

"I was thinking also of its home—the home it will never leave. I like to think that we *might* find people on Venus, and I would like to have a name on it that might be translatable into more friendly and less foreign terms—why not call it *Solarite*?"

"*Solarite*—a member of the solar system—it will be that, always—it will be a world unto itself when it makes its trips—it will take up an orbit about the sun—a true member of the solar system. I heartily agree with that name." Arcot turned to the others. It was agreed upon unanimously.

"But still I am curious about that glass bottle; it is so carefully sealed, rather imagine that there is some gas in there—but what is the object?" asked Morey with a puzzled smile.

"Wrong—it hasn't any gas in it—which is the reason for sealing it so carefully. What more appropriate for christening a space ship than a bottle of high-grade vacuum?

"We can't have a pretty girl christen this ship, that's sure. A flying bachelor's apartment christened by a mere woman? Never! We will have the foreman of

the works here do that. Since we can't have the ship slide down the ways or anything, we will get inside and move it when he smashes the bottle. But in the meantime, let's have a symbol painted on the bow. We can have a blazing sun, with eight planets circling it, and the earth painted very much more conspicuously; below it we can have *SOLARITE* printed."

The christening took place, and at last the ship was ready for the first trip into its natural medium—nothing. They were rising smoothly now, high into the air! At last they disappeared from the sight of the ground crew. It was shortly after noon when they left, but the sun was a great ball of fire low in the west when they returned, dropping plummet-like from the depths of space, the roar of the air about the hull, a long scream that mounted from a half-heard sound in the outer limits of the earth's atmosphere, to a roar of whining air as the ship dropped swiftly to the field and shot quickly into the hangar. Instantly the crew was running to the side of the ship, as the door of the ship opened. Something was wrong!

"Hey, Jackson—call the field doctor—Arcot had a little trouble out there in space!" In a moment the man designated was returning with the doctor, leading him swiftly down the long metal corridor of the *Solarite* to Arcot's room aboard.

There was a mean-looking cut in Arcot's scalp, but it was not serious, though he had been knocked unconscious by the blow that made the cut.

"How did this happen?" asked the doctor as he bathed the cut and deftly bandaged it.

"There is a mechanism on board here that is designated to get the car out of the way of meteors while we are in space, and it works automatically. Arcot and I were just changing places at the controls. During the time while neither of us was strapped into the seats, a meteor came within range and the rocket tubes shot the car out of the way. We both went tumbling over to the side of the ship as it jumped, and Arcot landed on his ear. I was luckier, and was able to break my fall with my hands, and then land on my chest, but it was a mean fall—for under the great acceleration developed we had about double weight, so, though it was only about seven feet, we might as well have fallen fourteen," explained Morey. "We took turns piloting the ship, and Arcot, who started, was about to bring us back, when that shock just about shook us all over the ship. We will have to fix that!"

The doctor was through now, and he began to revive his patient. In a moment he stirred and raised his hand to feel the sore spot. He was not yet fully conscious. In ten minutes he was conversing with his friends, however, slightly the worse for a very severe headache. The doctor gave him a mild opiate, and had him sleep off the effect of the blow in the car. The room where he was had been designed for his use, and was already fully equipped.

"Doctor Bailey, would you like to look over the ship?" asked Wade.

Naturally the doctor was quick to take the chance, and they started forward to the control room. Here the great fused quartz windows gave them a clear view in all directions except to the rear. There were five seats arranged in a semicircle before the main front window. The central seat was equipped with arms as broad as small tables, and on these arms there were instruments and controls. In the rear of the room was the main manual control board, its broad black surface dotted with dials and controls in a sequence unintelligible to the doctor.

"This is the main control board here—the ship can be controlled entirely from this point. The controls that we will actually use in most of the maneuvers, the speed control, the directional control, the ones that control our simple motions, are handled from the pilot seat there. That is the system used in working while in the atmosphere when we will be turning quickly. In space, if we do take over the manual control, the machine will be controlled from this board. As a matter of fact the course will be worked out by the mechanical director apparatus downstairs. The power room is a combined chemistry and physics laboratory, and automatic control room. I will start the generator, and you can listen to the relays down there automatically adjusting to the load. At the same time you will hear it sucking air in through the vent to warm the molecular director power units that drive it. When in the atmosphere, it pulls in air to warm it—out in space it gets heat from the sun."

They left the pilot room and walked on down the long corridor. On either side of the metal-walled hall there were rooms, and along the roof of the corridor there was a series of rungs like the steps of a ladder.

"What is the purpose of those rungs there?" asked the doctor curiously.

"Those are for descending the ship in space. We will have acceleration forward only, and when we are in space the back of the ship is down. That is why I say the power room is downstairs—it is the last room in the ship. In space we actually slide down that pole there; it is easier and quicker. Holding on with one hand, we can break the hundred and twenty foot fall easily, for the acceleration, and hence our weight, will be very small. Did you notice that the beds are arranged to strap the sleeper in position? The changing acceleration would throw him all over if we didn't. The walls of the ship are made of steel, the usual tungsten iron alloy and are highly magnetic. The result is, it is easy to walk about by means of magnetic shoes. The side walls will be the floor, and that will complicate matters, but we thought it best to design the ship for maneuvering in the air of some planet, since it is fully automatic in space.

"There are six bedrooms. There are only four going on this first trip, but that provides for future use. There is, of course, a kitchen also—but most of these rooms are storage rooms. There is a large battery just under the floor here, and beside it, filling in the curve of the ship, a large water tank. These are within the double walls of the ship, where it will be warm, to prevent the possibility of freezing them. We are expecting a warm climate on the planet Venus, so we are protecting the occupants of the ship from the heat while we are there by having double walls, with a vacuum in between. Hear that low hum? There are large gyroscopic stabilizers exactly in the center of the ship, holding it stable along all three axes, length, breadth and height."

Arcot spent the night aboard the ship, to wake the next morning feeling fully recovered, while the wound in his scalp was fully healed now, by the action of the *sanvernite* used in dressing it.

THE ship was fully equipped now, and the time for leaving had been set for the following Saturday, three days off. There were great supplies of stores to be carried aboard in the meantime, and the men worked busily carrying the packages aboard, and storing them carefully. Great care had to be exercised in this work, lest the cargo slip free when the accelerations of the *Solarite* were varying, and batter itself to pieces, or even wreck some vital part of the ship. It was nearly noon Saturday before they could say that the first ship that ever was to leave the bounds of the earth's gravity was ready to start!

Gently the heavily laden ship lifted from the floor, and slowly it went out into the bright sunshine of the early February day. Beside it was riding the little ship that Arcot had first built, piloted by the father of the inventor of the ships. With him rode the elder Morey and a dozen pressmen. The little ship was badly crowded now as they slowly rose high into the upper reaches of the earth's atmosphere. The sky about them was growing dark—they were going into space!

At last they reached the ultimate ceiling of the smaller ship, and it hung there while the *Solarite* went a few miles higher, then slowly, but ever faster and faster they were plunging ahead, gathering speed, they watched the radio speedometer creep up—1—2—3—4—5—6— steadily it was rising as the acceleration pressed them hard against the back of the seats—8—9—still it was rising as the hum of the generator back there became a low snarl—10—11—12—they were rocketing at twelve miles a second, the thin air about the ship was shrieking in a thin scream of protest as it parted on the streamlined bow. The vertical power units were driving the ship toward earth—still it hung on the centrifugal force—they seemed flung from earth with a weight of more than 300 pounds apiece. Even this thin air offered considerable resistance at this terrific speed, and the thin air gave little heat so the power was low—still the speed rose slowly—and reached fifteen miles a second. Now the sun was really pulling them; they were falling toward the sun—away from the earth—the shrill screech of the air outside could not reach them through the vacuum walls, but there was a microphone on the outside that they might hear, and through the loud speaker in the control room came the thin wail of the air—then Arcot shouted to them in warning:

"Hold on—we are going to lose weight—out into space!"

There was a click, and a sudden sensation of falling—the ship seemed to reel beneath them—the angry snarl of the overworked generator died in an instant as the thudding relays cut it out of the circuit—they seemed falling with terrific and ever-increasing speed—they looked down—saw the earth shrinking visibly as they shot away at more than five miles a second—they were traveling fifteen miles a second ahead and five a second straight up. The men were watching with intensest interest as the heavens opened up to them—the air was left far behind, and they could see stars now a scant degree from the sun itself, for no air diffused his blinding glory. The heat of the rays seemed to burn them, there was a prickling pleasantness to it now, as they looked at the mighty sea of flame through smoked glasses. The titanic flames of the corona reached out like the arms of some flaming octopus through thousands of miles of space—huge arms of flaming gas that writhed out in vain attempts to reach and drag back the whirling planets to the parent body. All about the mighty sphere, stretching far into space, a wan glow seemed to ebb and flow, a flow of swift-changing color, mighty streamers of light that waved and fluttered a million miles in space. The colors seemed to flow with majestic slowness, but it was only the mighty scope of the thing that gave it this appearance, for these colors flashed about at close to the speed of light. It was the zodiacal light, an aurora borealis on a scale inconceivable!

Arcot was working rapidly with the controls, the absence of weight that gave that continued sense of an unending fall, aided him and his assistants now in their rapid work of changing the controls from an air flyer to a space ship. The air scoop that had carried the air to the generator was closed off in a moment; there was a hiss of gas as the air was flooded into the room, and a moment later the hull vibrated with the acceleration of the generator as it again picked up speed. With the leaving of the air that warmed and drove it, as they fell out into space, the machine had been robbed of its source of power, and it had stopped. Now again it was working smoothly, using the heat of the sun. The lights of the ship flashed on again as the machine gained speed, and they had some slight weight once more as the steady pull of the power units recommenced, the pull that would continue unceasingly till they at last fell into the atmosphere of Venus.

At last the work was done and the ship was going on its way under the control of the instruments that would guide it across all the millions of miles of space and land it on Venus with the unerring certainty of a machine. The photo-electric telescopic eye was watching the planet constantly, keeping the ship surely and accurately on the course that would get them to the distant planet in the minimum of time.

"Better start the ozonator, Wade—we don't want to get an overdose of ultra-violets! We will be able to look around in a minute—and for the next five days or so we will have the same things to look at!" said Arcot.

The ozonator was a simple apparatus designed to keep the correct amount of ozone in the air of the machine, for on earth there is a layer of the gas in the atmosphere that filters the sunlight to the same type of rays at all times, the type that the human body has become accustomed to. Through countless eons man has lived in this environment, and this is what he must have. Less, as was found out in the first half of the twentieth century would result in disease; more would result in burns.

The ozone was the gas that regulated the supply in such a way that man had become accustomed to it. Had there been none, man would have developed an ability to adjust himself to changes in ultra-violet light just as he has become accustomed to changes in temperature.

At last the work of preparing the ship for the trip was over, and the men could rest and use their time to observe the beauties of the skies as no man had ever seen them during all the billions of years of time that this solar system has developed—unless it be, as some think, that Mercury once had a population ere it became the desert waste it is, and that all of us, all in the solar system, are descendants of that long dead race.

The lack of atmosphere made it possible to use a power of magnification that no terrestrial telescope may use.

The blurred outlines produced by the shifting air prohibits magnifications of more than a few hundred diameters, but here in space they could use the greatest power of their telescope. With it they could look at Mars and see it more clearly than any other man had ever seen it, despite the fact that it was now over two hundred million miles away, and at times it comes to one sixth that distance from the earth.

But though they spent much time taking photographs of the planets and of the moon, and in making spectrum analyses of the sun, they found the time passed very slowly. Day after day they saw measured on the clocks, but they stayed up, and found they needed little sleep, for they wasted no muscles. Their lack of weight made them lack fatigue. However, they determined that during the twelve hours before reaching Venus they must be thoroughly awake, so they tried to sleep in pairs just before coming near the planet. Arcot and Morey were the first pair to seek the arms of Morpheus—but Morpheus seemed to be a mundane god, for he did not reward them, and at last it became necessary to take a mild opiate, for their muscles refused to permit the tired brain to sleep. It was twelve hours later when they awoke, to relieve Wade and Fuller.

They spent most of the twelve hours before them now in playing games of chess. There was little to be done. The silver globe before them seemed unchanging now, for they were still so far away it seemed little larger than the moon does when seen from earth.

But at last it was time for the effects of the mild drug to wear off, and for Wade and Fuller to wake soon from their sleep.

"Morey—I wonder if it might not be interesting to observe the reactions of a man waking suddenly from sleep to find himself alone in space?" Arcot was staring thoughtfully at the control that would make the ship perfectly transparent, perfectly invisible. There was an expression of perfect innocence on his face—but a twinkle of humor in his eyes.

"I wonder if it would?" said Morey grasping Arcot's idea. "What do you say we try it?" Arcot turned the little switch—and where there had been the ship, it was no more—it was gone!

FULLER stirred uneasily in his bed, tight strapped as he was. The effects of the drug were wearing off. Sleepily he yawned—stretched, and blindly, his heavy eyes still closed, released the straps that held him in bed. Yawning widely he opened his eyes—with a sudden start he sat upright—then, after giving an excellent phonetic imitation of a wild Indian on the warpath, he leapt from his bed, and started to run wildly across the floor, his eyes raised to the place where the ceiling should have been—calling lustily in alarm—then suddenly he was flying up—and crashed heavily against the invisible ceiling! His face was a picture of utter astonishment as he fell lightly to the floor—then slowly it changed, and took on a chagrined smile—he understood!

He turned in amazement as loud cries suddenly resounded from Wade's room across the hall—then there was a dull thud, as he too, forgetting the weightlessness, jumped and hit the ceiling. Then the cries were gone, like the snuffing of a candle. From the control room there sounded loud laughter—and a moment later they felt more normal, as they again saw the four strong walls about them, and could again see the feet they stood on.

Quickly they dressed now, and each stepped out into the main hall, just in time to meet each other.

"Wade, did you hear those two morons up there? Such a sense of humor! Well, I suppose we must expect such things from them. I think it should be a lesson to us not to trust anything so valuable as this ship in the hands of a weak-minded pair like that again. One of us must always be on guard," said Fuller seriously—and rather loudly.

Wade sighed heavily and shook his head.

They were approaching the planet visibly now. In the twelve hours that had passed they had covered a million miles, for now they were falling into the planet under its attraction. It glowed before them now in wondrous splendour, a mighty disc of molten silver, far more beautiful than the moon ever was—a silver that made the moon a dull and tarnished globe in comparison. The strength of the reflected light was such that at their present distance of three quarters of a million miles it was almost uncomfortably bright. They could read a book with ease.

For the last twenty-four hours they had been trying to reduce their speed relative to Venus, lest they be unable to form an orbit about the planet, and shoot around it and back into space. Their velocity had been over a hundred miles a second part of the way, but now it had been reduced to ten. The gravity of the planet was urging them forward at ever increasing speed, and their problem was more difficult to solve.

"We will never make it on the power units alone, out here in space," said Arcot seriously—"We will just shoot around it. I tell you how we can do it, though. We will go around it, entering its atmosphere on the daylight side, so that we won't be frozen to death in its shadow, and shoot into the upper limits of its atmosphere. There the power units will find some heat to work on, and we can really slow down. But we will have to use the rocket tubes to get the acceleration we will need to drive the ship into the air."

There was a sudden clanging of a large bell—everyone dived for a hold, and held tightly. Not an instant later then there was a terrific wrench as the rocket avoiding mechanism threw the plane out of the way of a meteorite.

"We are getting near a planet. That is the third meteorite we have met since we were more than a million miles from earth. Venus and earth and all the planets act like giant vacuum cleaners of space, pulling into themselves all the meteorites within millions of miles by their gravitational attraction."

Swiftly the planet before them was expanding—growing each instant vaster. It had changed from a disc to a globe, and now, as the molten silver of its surface seemed swiftly clouding, it turned grey; then they saw the true appearance, a vast field of rolling, billowing clouds!

They were shooting about the planet now at ten miles a second, far more than enough to carry them away from the planet again, out into space once more if not checked.

"Hold on everybody—we are going to turn toward the planet now!" Arcot depressed a small lever—there was a sudden shock, and all the space about them was a blazing furnace of huge, deep-red atomic hydrogen flames.

The ship reeled under the sudden pressure, but the heavy gyroscopic stabilizers caught it, held it, and the ship remained on an even keel. Then suddenly there came to the ears of the men a long drawn whine, faint —almost inaudible—but there it was—the ship seemed slowing down. The loud-speaker was rapidly increasing its power—the *Solarite* was entering the atmosphere of a new world—the first machine that man ever made to thus penetrate the air of other worlds!

Arcot was working busily now—quickly he snapped open the control that had kept the rocket flaming, turning the ship to the planet—driving it into the atmosphere —now they could get their power from the air that each instant grew more dense about them.

"Wade—in the power room—emergency control post —Morey—control board there—hang on, for we will have to use some husky accelerations."

Instantly the two men were diving for their posts—literally diving, for they were still nearly weightless.

Arcot pulled another lever—there was a dull snap as a relay in the power room responded—then the lights wavered—dimmed—then in an instant the generator was once more humming smoothly—working on the atmosphere of Venus!

Working feverishly now—they had but a short time to change back from space-ship to air-ship—in the atmosphere of a new world. In a moment the power units were again operating, and now they produced a force that made the men grasp their holds tightly, as they sucked a plenitude of power from the surrounding air.

The loud-speaker had shrieked louder and louder, till it poured forth a deafening wave of sound. Now it was silent, for Fuller had opened the circuit. Around them the rapidly increasing density of the air made the whine grow to a roar—the ship was growing slightly warm from air friction, despite the extremely cold air at this altitude—more than seventy-five miles yet from the surface of the planet.

They were dropping rapidly now—their radio-speedometer had fallen from ten to nine—then slowly, but faster and faster as more heat could be extracted from the air it had fallen 8—7—6—5—4—now they were well under orbital speed, falling under the influence of the planet, the struggle was over—the men seemed to loosen up, the ship was running quietly now, the smooth hum of the air rushing over the great power units coming softly through the speaker again, a humming melody in their ears—the song of a new world.

SUDDENLY the blazing sun was gone—they were floating in a vast world of rolling mists—mists that struck the car with tiny clicks, which, in the millions of particles that were hitting each instant, summed up to a steady roar in the microphone.

"Ice—ice clouds! We will drop down below the clouds, probably they extend for miles. Look, already they are changing—snow now—in a moment it will be water—then it will clear away—and we will be in the steaming air of Venus!"

For ten miles—ten endless miles it seemed they dropped through clouds utterly impenetrable to the eye—then slowly the clouds became thinner; there appeared brief clear spots, spots into which they could see short distances—then here and there they caught glimpses of green below—was it water? or land?

Then with a suddenness that startled them, they were out of the clouds, shooting smoothly along at one mile a second over a broad plain—it seemed to stretch for endless miles across the globe, to be lost in the far distance to the east and west, but to the north they saw a low range of hills that rose blue and misty in the distance.

"*Venus*—We made it! The first men to ever leave earth—I'm going to start the old sender and radio back to them! Man—look at that stretch of plain!" Morey had jumped to his feet and was starting across the control room. "Lord—I feel like a ton of lead now—I sure am out of condition for walking after all that time just floating!"

"Whoa—wait a minute there, Morey—you won't get anything through to them. The earth is on the other side of Venus now—it is on the night side, remember—we are on the day side. There are 7700 miles of rock and metal between here and the free space—then it has 45,000,000 miles or so to go before it hits the earth's atmosphere, and since you are using beam sending, it will have to penetrate the 8000 miles of earth before it reaches old New York. As I see it, we are now on the daylight side of this planet—which corresponds in time to the night side of earth. Thus, in about twelve hours we will be able to send a message. In the meantime, take the controls while I make a test of the air here, will you, Morey?" Arcot, relieved of the controls, rose and walked down the corridor to the power room where the chemical laboratory had been set up. Wade had already collected a dozen samples of air, and was working on them.

"How is it—what have you tested for so far?" asked Arcot.

"Oxygen and CO_2. The oxygen is about twenty-two percent, or, considering the slightly lower air pressure here, we will have just about the right amount of oxygen. CO_2 is down to about one-tenth of one percent. That means that there must be a lot of animal life here considering the obvious plenitude of vegetable life.

"But one thing surprises me, I had a piece of titanium ribbon in there—the oxygen I took out with phosphorus, and it won't burn. Titanium burns brilliantly in nitrogen, of course—in the earth's atmosphere the titanium will burn nearly as well after the oxygen is out as before. I can't get it—the atmosphere is O.K. for terrestrial life apparently; that mouse there is living quite happily."

"Whatever the other seventy-five percent or so of diluting gas is, I don't know. Of course, I took out the water—passed it over calcium oxide. Magnesium ribbon won't burn in it, so it isn't any oxide—though I couldn't think of any it might be—if it were CO_2 it would dissolve in the ocean at anywhere near that concentration. What do you make of it?" Wade was frankly stuck—it was beyond him.

"Well—let's see. That mouse is living peaceably long enough—so it can't be very deadly—I think it would like to smell it." Arcot picked up the jar, and moved the glass cover to one side, and sniffed cautiously. "Quite odorless. I rather expected that—all gases that are reasonably inert are odorless. Is it very soluble in water? No, it can't be—there are large oceans here all right—fifty percent humidity and the temperature at five miles is one-ten! A hundred and ten degrees five miles up! I wonder what it's like at the surface—worse than Death Valley in July."

"But let me see that gas again—what is the molecular weight of it?"

"Haven't made any careful measurements—couldn't with the ship jumping as it has been—but as near as I can tell it is about 35 or 34—nearer the 35."

"Hmmm, allowing it is an element—if it isn't, either the magnesium or the calcium oxide should have done something to it—that means it isn't chlorine—we knew that anyway—but that has a molecular weight of 71; it can't be anything above that—wait a minute—of course—hooo—stupid—it's *argon!* No wonder it wouldn't attack magnesium or titanium! I wonder how we were so thick as to miss it! It is a little light—but I'll bet there is considerable nitrogen in it and that would make it come down toward 28, and probably there is a lot of helium and neon and the other inert gases in it. But what an atmosphere! No great amount of nitrogen; that means that life will have a sweet time extracting it from the air—but wherever there is life—it finds a way of doing the impossible. Test it more accurately, will you—you try for nitrogen and I will try the component inert gases."

They ran the analysis rapidly, and in a very short time—less than an hour—their results stood at 23 percent oxygen, 14 percent carbon dioxide, 68 percent argon, 6 percent nitrogen, 2 percent helium, 5 percent neon, .05 percent hydrogen, and the rest krypton and xenon apparently. The analyses of these inert gases had to be done rather roughly in this short time, but it was sufficient to balance fairly accurately. On ionizing the gas in a small tube, they found that, unlike the bluish glow of earth's air it gave off a reddish grey color—a curious light of a ghostly hue.

THE two chemists reported back to the control cabin. The others had been observing everything within range with the aid of the small telescope they had brought along. The hills seemed quite distant, but Arcot pointed out that it would be a very misty day on earth now, with such a high humidity. The slight difference in the radius of curvature of the sphere was, of course, unnoticeable.

"Well, we will be able to breathe the atmosphere of Venus with ease. I believe we can go on now. I have been surprised to see no water in sight, but I think I see my mistake now. You know the Mississippi has its mouth further from the center of the earth than its source; it flows up hill! The answer is, of course, that the centrifugal force of the earth's spin makes it tend to flow in that way. Similarly, I am sure now that we will find that Venus has a vast belt of water about the middle, and to the north and south there will be two great caps of dry land. We are now on the northern cap.

"We have the microphone turned way down. Let's step up the power a bit and see if there are any sounds outside," said Arcot and walked over to the power control switch. An instant later the loud-speaker was humming softly. There was a light breeze blowing. In the distance, though, forming a dull background for the entire hum, there came a low rumbling that seemed punctuated now and then by a greater burst of speed.

"Must be a long way off," said Arcot, a puzzled frown on his face. "Swing the ship around so we can see in what direction the sound is loudest," he suggested.

Slowly Morey swung the ship around on its vertical axis. Without a doubt, something off in the direction of the hills was making a considerable noise.

"Arcot—if that's a fight between two animals—two of those giant animals that you said might be here—I don't care to get near them!" Fuller was listening to the sounds, and looking off across the plain to the low hills in the blue distance.

"If it is two animals fighting—we will leave this planet while we still can! Any animal that can make a racket like that—well, I don't think it can exist!" Arcot was smiling to think of the size lungs that roar would require.

The microphone was shut off while the *Solarite* shot swiftly forward toward the source of the sound. Quickly the hills were growing, the blue mistiness disappeared, and they showed as bleak harsh rock; but as they came nearer they saw over the tops of the hills now, flashes of light that intermittently came into being.

"A thunderstorm! Ho—that's good—there is your animal, Fuller!" laughed Wade.

"Not so fast, Wade—his animal is there—the only animal in all creation that can make a noise like that! Look through the telescope—see those dots wheeling about there above the flashing lights—there one got hit—there are no clouds there—no thunderstorm—the only animal that can cause that racket is *man!* There are men over there—and they aren't in a playful mood! Turn on the invisibility while we can, Morey—and let's get nearer!"

"Men—look out—here we go!" Morey slipped a tiny switch set in one side of the instrument panel—then, before the relay below could move, he had flipped it back.

"Here—you take it, Arcot—you always think about two steps ahead of me—you are quicker and know the machine better, anyway."

Quickly the two men changed places.

"I don't know about that, Morey," said a voice from the air—for Arcot had at once thrown the ship into invisibility—the ship was gone like the light of an extinguished candle. "The longer we stay here, the more mistakes I can see that we made in our calculations of what would happen. I see what put me off so badly on the estimate of the intelligence of people found on this planet! The sun gives it a double dose of heat—but also a double dose of X-Rays! Since about 1928 it has been known that X-Rays speed evolution. Just the same, we may be able to find friends here more quickly if we aid one side or the other in the very lively battle going on there. Now, before we go any further, we want to decide whether or not to aid either side."

"I think it is a fine idea. But which side are we to aid—and what are the sides. We haven't even seen them yet. Let's go nearer and take a good look at them; certainly we ought to know that before we decide," said Fuller.

"Yes—but are we going to join either side at all after looking?"

"Oh, that's unanimous!" said Wade, excitedly.

Quickly the invisible ship darted forward. Soon they had passed the barrier of the low hills, and were again out on a broad plain. Suddenly all the men gasped in surprise! Well they might! There, floating high in the air, above a magnificent city, was a machine such as no man had ever before seen! A titanic airplane it was! Yet so monstrous, so gargantuan, that it beggared description. Fully three-quarters of a mile the huge metal wings stretched out in the dull light of the cloudy Ve-

nerian day; such a titanic machine it was that it seemed to dwarf even the mighty city beneath! The roar of its mighty propellers came as a rumbling thunder to the *Solarite*. From it were coming the flashing bursts of flame. Now, on closer inspection, it was possible to make out what seemed a swarm of tiny gnats flying about the mighty plane. They seemed to be attacking the giant as vainly as the gnats might attack an eagle, and as foolhardily, for they could not damage the mighty machine. Their flashing bombs that rained down upon it burst in blasts of yellow flame as harmlessly as so many firecrackers.

All that mighty machine was covered with heavy metal plates, ten inches thick, and of metal so tough that when the powerful bombs hit it they were ineffectual, though they blew great craters in the soil below. Yet from it poured a steady stream of bombs that seemed to burst with a great flash of heat and light, and in an instant the tiny planes they struck darted down an incandescent mass of metal.

Yet the giant seemed unable to approach the city—or was it defending it? No, for it was from the city that the vainly courageous little ships poured out. But certainly it was not these ships that kept the titanic battleship of the air at bay?

CONSTANTLY the great ship was sending its bombs toward the city, only to have them fall short of it. But slowly, around the city, there was appearing an area of red hot, molten rock and dirt, and steadily this was moving inward as more and more shells from the great plane struck it. Then suddenly the battleship of the air turned toward the city and made a short dash inward on its circling path. Instantly it was apparent why the ship had not attacked the city directly, for up from the ground, a few hundred feet from the ring of molten rock, there leaped a long ray of hissing white flame. It reached up and seemed almost to touch the great machine. Then, as the titanic plane rolled, and side-slipped out of the way, it passed, harmless, a little shy of the monstrous wing.

"Which? I say the city. No one should destroy so magnificent a city. Also they are losing, which will make our aid all the more welcome," suggested Arcot.

"The city it is, I guess." All the others agreed, so Arcot started nearer. "But what in the world can we do to that huge thing? It has perfect invulnerability through size alone. It will be like attacking a battleship with a rowboat, as the old mariners would have said." Fuller was looking fascinatedly at the scene before him —though no one could tell just where he was gazing, since the entire ship was as invisible as air.

Now it seemed that one of the men of the city had a system to wreck the giant plane—the mighty propellers. There were fifty of these strung along each of the titanic wings; the giant monoplane seemed to be vulnerable only there—for if enough of these could be broken, eventually they would be able to blow holes in its armor, while it lay helpless on the ground. They had apparently tried to bomb the gigantic metal blades, but the rushing, swirling air currents had thrown the bombs aside, or smashed them against the thick armor. Now one of the little planes darted forward and dove at full speed directly against one of the propellers! But the sacrifice was in vain—there was indeed a terrific crash—one that made the loud speaker in the invisible *Solarite* tremble. Yet the mighty blades were functioning as smoothly as ever!

Indeed, it seemed that the *Solarite* would be as utterly helpless as any against that titanic machine. Now Arcot was climbing the machine high into the sky above the great plane. There was a full mile drop between them when he released the sustaining force of the *Solarite* and let it drop, straight toward the source of the battle—falling freely, ever more and more rapidly; they were pushing at the mighty plane below at a pace that made their hearts seem to pause—then suddenly Arcot cried out, "Hold on—here we stop!"—they seemed a scant hundred feet from the broad metal wings of the great plane, which was hanging beneath them, totally unaware of the *Solarite*. Then suddenly there was a tremendous jerk, and each man felt himself pressed to the floor of the machine with a terrific weight that made their backs crack with the load. Almost unconscious they seemed. Below them was nought but a mighty sea of roaring red flames—a hell of blazing gas that roared like a million bombs at once. The *Solarite* was sitting down on the rockets! All six of the rocket tubes in the bottom of the car had been opened wide, and streaming from them in a mighty blast of incandescent gas, the atomic hydrogen was shooting out in a mighty column of gas at 3500 degrees centigrade. In an instant the great plane was incandescent where the gas touched it, and in an interval so short that it was almost immeasurable, the fall of the *Solarite* had been checked, and it was rebounding high into the air again. As soon as Arcot could, he reached a hand that was weighted down with the load of six gravities and pulled shut the little control that had sent those mighty torches flaming out. Then an instant later they were racing ahead lest the plane shoot bombs toward the gas columns.

Then at last they were able to look at their work! No longer did they see the mighty plane unscathed, invulnerable, for now there glowed six great craters of incandescent metal that almost touched and coalesced. The great plane itself was reeling, staggering, plunging downward, but long before it reached the hard soil below it was brought out into level flight, and limping, for several of its engines were dead now, it circled and made off toward the south. The horde of small planes followed, dropping a rain of bombs into the glowing holes in the ship that made them grow swiftly larger. But now the men of the ship had to a large extent recovered from the shock of the attack and were fighting back. In a moment—just before the ship passed over the horizon and out of sight, the Terrestrians saw the great props that had been idle, suddenly leap into life, and in an instant the giant had left its attackers behind—fleeing, wounded from its invisible foe.

It was agreed that they return to the city and become visible.

Again they turned, and slowly went back, still invisible, to the approximate spot where they had destroyed the invulnerability of the Giant. Then suddenly, out of nothing, the *Solarite* appeared. In an instant a dozen of the tiny two-man planes were darting toward it. Just that they might recognize it, Arcot shot it up a bit higher with the aid of the keel rockets at one-third power. Still, the typical reddish flame of atomic hydrogen was instantaneously recognizable.

Little these planes were, but shaped like darts, and swifter than any plane earth had—they shot along at

1000 miles an hour readily, as Arcot soon found out. It was not a minute before they had formed a long line that circled the *Solarite* at minimum speed, then started off in the direction of the city. On impulse Arcot followed after them, and instantly the planes shot their velocity up. It was quickly indeed that they reached a thousand miles an hour, and rocketed smoothly along.

The city they were approaching was an inspiring sight —mighty towers that reached their graceful lines a half mile in the air, their sides of brightly colored material of some kind gleaming in warm hues seemed to make the entire city a gigantic jewel—one lone piece of architecture, for here no individuals were looming out. There was no irregular skyline, but every unit tended toward the gigantic edifice that rose, its gleaming tower of black and gold a full half mile in the air.

The outer parts of the city were evidently the residential districts, the low buildings and wide streets with the little green lawns showing the care of the individual owner. Then came the apartment houses and the small stores; then they rose in gentle slopes, higher and higher, towering at last to a mighty pinnacle of beauty—a single resplendent jewel of flashing color, designed as a whole, and not in a multitude of individually beautiful, but in harmonious units, like some wild mixture of melodies, each in itself beautiful, but mutually discordant.

NOW the Terrestrians were following their escort high above these great buildings, following them to the great central tower. In a moment they were above it, and in perfect order the ships of the Venerians shot down to land smoothly, but at high speed. On the roof of the building they slowed with startling rapidity, held back by electromagnets under the top dressing of the roof landing, as Arcot learned later.

"We can't land on that—this thing weighs too much—we'd probably sink right through it! I'll go down into the street there and land—it looks wide enough!" Arcot maneuvered the *Solarite* over the edge of the roof, and then dropped it swiftly down the half mile to the ground below. Just above the street level he held it up, and lowered it gently, giving the hurrying crowds plenty of time to get from beneath it.

Then, in anxious curiosity, he landed it, and looked quickly at the crowd of Venerians who had gathered in the busy street, coming out of the buildings where they had, no doubt, sought shelter during the raid. It was a rapidly growing crowd as the Terrestrians looked interestedly at these people of a new world—a people that no man had ever seen.

"Why," said Fuller in startled surprise, "they look almost like us!"

"Of course," laughed Arcot—"and what did you expect. There are certain prerequisites that any intelligent creature must have. He must have a brain, of course, but also he must have tools, for that is the only way the intelligence of the brain may be expressed. To not only give him those necessary tools, but also to permit him to hold his brain case more out of harm's way, and get a wider range of vision, he stands on his hind legs, thus freeing his forelegs for work.

"The first requisite of any animal that is to rule the planet of his home, is that he have physical strength enough to cope with the problems about him. He must be strong enough to fight his enemies. But since he also has intelligence, he must be strong enough to use the tools he makes. It would seem an elephantine beast was the obvious candidate for intelligence—but he isn't. On earth, Nature tried out the giant reptile and discarded it. He was so big he didn't have to develop intelligence, perhaps. Then the insect—Nature tried that—developed intelligence there—but it was so small, that it couldn't do much toward changing the face of the earth to suit itself, so it, too, was put aside. Then, in a creature half way between the two, Nature found the best possibilities. But the greatest asset she gave man was the thumb; with it he is able to hold the tools he makes, among many other things, and it is the thing that has done most toward developing man's intelligence.

"But further on the question of size. If man was much bigger, he would be fragile. Can you imagine an elephant jumping? No, he couldn't; he would break his legs under his own weight if he did. A thing that size can't be agile as Man had to be.

"But here, on this planet, we have a lesser gravity, and to the degree of that lesser gravity the animals could be larger than those of earth, without exceeding the breakage limit. I think that explains the size of those Venerians."

Certainly it needed some explanation, for in all that crowd, only the obviously young were under six feet. The average seemed to be seven feet, with rather large chests—well-built men and women, who would have seemed very much human indeed, but for a ghastly, death-like blue tinge to their skin. Even their lips were as bright a blue as man's lips are red. The teeth seemed to be as white as any human's, but their mouths were blue.

"Why, they look as if they had all been eating blueberries!" laughed Wade. "I wonder what makes their blood blue? I have heard of blue-blooded families, but these are the first I have ever seen!"

"I think I can answer that, also—I have been reading about various forms of life recently," said Morey slowly. "It seems odd to us—but those people have their blood based on hemocyanine. In us, the oxygen is carried to the tissues, and the carbon dioxide carried away by an iron compound, hemo-globin, but in many animals of earth, the same function is performed by a copper compound, hemo-cyanin, which is an intense blue. I am sure that that is the explanation for these strange people. By the way, did you notice their hands?"

"Yes, I had. I know they are different from ours, but I haven't had a good look at them and can't say in what way they are different. They strike me as having one too many fingers—look—there—that fellow is pointing —why—his hand has not too many *fingers,* but too many *thumbs!* He has one on each side of his palm! What good does that do him—let's see, if I put one hand on top of the other, palm to back, I get the same effect—say it would be handy in placing nuts and bolts, and such fine work, would it not?"

Suddenly a lane opened in the crowd, and from the great black and gold building there came a file of men in tight-fitting green uniforms, a file of seven-foot giants. Obviously they were soldiers of some particular branch, for in the crowd there were a number of men dressed in similar uniforms of deep blue.

"I think they want one or more of us to accompany them. Let's flip a coin to decide who goes—two better stay here, and two go. If we don't come back inside of a reasonable period of time, one of you might start mak-

ing inquiries; the other can send a message to earth, and get out of harm's way till help can come. I imagine these people are friendly now, however—else I wouldn't go."

As Arcot finished, the leader of the troop stepped up to the door of the *Solarite,* and coming to what was obviously a position of attention, put his left hand over his right breast in an equally obvious salute, and waited.

The coin was flipped with due ceremony—it was to decide which of them were to have the distinction of being the first Terrestrians to set foot on Venus. Arcot and Morey got the luck, and they quickly put on the loose-fitting ventilated cooling suits that they might live comfortably in the hot air outside—for the thermometer registered 150!

The two men quickly walked over to the entrance door of the air lock, entered, closed it behind them, and opened the other door. There was a slight rush of air as the pressure outside was a bit lower than that inside. At once there was a singing in their ears, and they had to swallow several times to equalize the pressure. The guards at once fell into a double row on either side of them, and the young officer strode ahead. He himself had curbed his curiosity after the single startled glance he had given these strange men. Only their hands were visible, for the cooling suits covered them almost completely, but the strange pink color must indeed have been startling to his eyes; also their dwarf stature, and the strange suits they wore. The men of his little troop, however, as well as the people in the crowd about them, were not so disinterested. They were looking in eager amazement at these men who had but just saved their city, these strange small men, with their queer pink skin. And most surprising of all, perhaps, the inner thumb was missing from each hand!

But soon they had passed beyond the sight of the crowd, which was held in check by a handful of the deep blue uniformed men.

"Those fellows would never hold such a Terrestrial crowd back if visitors from another planet landed!" remarked Morey wonderingly.

"How do they know we are visitors from another planet? We suddenly appeared out of nowhere—they don't even know our direction of approach. We might be some strange race of Venerians as far as they know, though their swift planes must have carried them over all Venus long before now!" Arcot replied.

They had walked quickly up to the great gold and black entrance, and passed through the great doors that seemed made of great masses of solid copper, painted with some clear lacquer that kept the metal lustrous, the rich color shining magnificently. They stood open wide now, as indeed they were always. To these men of a copper starved world, where copper was practically as dear as silver, this seemed a tremendous investment. Even the giant Venerians were dwarfed by these mighty doors as they passed through into an equally vast hall, a mighty room that must have filled all the front half of the ground floor of the gigantic building, a hall of graceful columns that hid the great supporting members. The stone, they knew, must serve the Venerians as marble serves us, but it was a far more handsome stone. It was a rich green, like the green of thick, heavy grass in summer when the rain is plentiful, rich and thick, a soft wavy green. The color was very pleasing to the eye, and restful too. There was a checker-board floor of this green stone, alternated with another, a stone of intense blue. They were hard, and the colors made a very striking pattern, pleasingly different from what they had been accustomed to, but common to Venus, as they soon learned.

Arcot dropped quickly to one knee, and started to examine the green stone closely, felt of it an instant, then jumped up in surprise, shaking his hand; a moment he looked surprised—puzzled. Then he laughed. The guards who had been accompanying them had halted, and were watching them with interest and amusement—examining the material of a common floor!

"Why—I forgot—I won't again, though—look out that you don't touch anything unnecessarily, Morey—everything here is at a temperature of 150 remember, and is most unpleasantly hot. I almost burned my hand! It was more surprise than anything else that made me jump, but I think I know what that green stone is—it's chromic carbonate in some natural form that we don't have on earth. These fellows might just as well say that a stone, such as marble, couldn't exist, because they had never seen it—and man has never yet duplicated the work of nature in making Iceland spar—crystallized calcium carbonate, yet it is chemically the same as limestone! But let's move on—they are obviously waiting for us."

THERE were many soldiers in the great hall that they were crossing, and as the little party walked on, they stopped and looked in surprise at the strangely hooded figures.

At last the party had crossed the great hall, and stopped beside a large doorway. The officer stopped for a moment, pointed out two of his men, who remained, while the others walked quickly away. The diminished party stepped through the doorway into a small room whose walls were lined with copper apparently, and an instant later, as the officer pushed a small button, there was a low hiss of escaping air, and a copper grating sprung quickly up across the opening of the elevator. Then another button, and there was the familiar sinking feeling as the car rose, a low hum seeming to come from the lower part of the car.

The car rose swiftly through a very considerable distance—up—up. It seemed that no car could work over that great climb.

"They must have some wonderfully strong cables here on Venus!" Morey exclaimed. "The engineers of the Terrestrial buildings have been wondering for some time how to get around the difficulty of shifting elevators. The idea of changing cars doesn't appeal to me, either—but we must have risen a long way!"

"I should say so—I wonder how they do it. We have been rising for a minute and a half at a very fair clip—there we are—I want to look at this car!" Arcot at once stepped over to the little row of buttons on the control board, looked at it closely, then stepped out quickly and peered down between the car and the shaft as the copper grating fell, simultaneously pulling down with it the door that had blocked off the hall-way.

"Come here, Morey—simple system at that! It would be so, of course—look—they have tracks, and a regular trolley system, with cog rails alongside and the car just winds itself up! They have an electric motor underneath, I'll bet, and just run it up in that way. They have never done that on earth because of the terrible cost of running the car up without any counterbalance—

it would be too expensive—require too much power. I think I see the solution—the car has electro-dynamical brakes, and going down, just slows itself down by pumping power into the line to haul some other car up. This eliminates the difficulty of cables that can't carry their own weight very nicely. The counterbalance means that at least a mile of cable must be used in raising the car one-half mile, actually some six miles of wire cable—this is a mighty clever scheme!"

As Arcot straightened, the officer beckoned to him to follow, and started down the long corridor which was lined on either side with large doorways, on which there was painted in black characters some inscription, evidently the directory of the floor.

Through a long series of the branching corridors they at last reached one that had but one exit, into a large office, into which the young officer led them. Immediately he snapped to attention, spoke briefly and rapidly, saluted and retired with his two men.

The man before the Terrestrians now was a tall, kindly faced old gentleman, his straight black hair was turning slightly to a very light blueish, almost a grey, in spots, but the kindly face, the smiling eyes, and an air of sincere interest seemed to illumine the entire countenance. He looked curiously, questioningly at the two men before him, looked at their hands, his eyes widening in surprise; then he stepped quickly forward, and extended his hand, at the same time looking toward Arcot.

At once Arcot understood him and extended his hand. The Venerian took it in his hand—then with an exclamation on the part of each, they mutually released each other, for Arcot felt a decidedly uncomfortable degree of heat, almost scaldingly hot, just as the Venerian felt a degree of intense cold! Each seemed staring from his hand to the hand of the other in surprise, then a smile lighted the face of the Venerian as he very emphatically put his hand at his side. Arcot smiled at him, and said to Morey in an animated tone:

"They have a body temperature of at least 170 Fahrenheit. It would naturally be above room temperature, which is 150 here, so that they are most unpleasantly hot to us. Many forms of earth-life would be killed by that temperature, but there are, of course, different forms of life here on Venus, modified to stand that temperature as natural. I hope these fellows don't have fevers! They would be apt to boil over!

"But really they have some 40 degrees leeway, and as the temperature of the human body varies never more than eight degrees, they are safe enough, I guess."

"But they must have to boil all their food under increased pressure here; a difference of 40 degrees would probably be insufficient!"

The Venerian had picked up a small rectangle of black material, smooth and solid. With it as a tablet he drew quickly on it with a pencil of copper, apparently. In a moment he handed the tablet to Arcot, who reached out for it, then thought better of it, and motioned that he didn't want to burn his fingers. The old Venerian held it where Arcot could see it.

"Why, Morey, look here—I didn't think they had developed astronomy to any degree, because of the constant clouds, but just look here. He has a nice little map of the solar system, with Mercury, Venus, Earth, the Moon, Mars, and all the rest on it. He has drawn in several of the satellites of Jupiter and of Saturn too."

The Venerian pointed to Mars and looked inquisitively at them. Arcot shook his head and pointed quickly to earth. The Venerian seemed a bit surprised at this, then thought a moment and nodded his head in satisfaction. He looked at Arcot intently a moment. Then to Arcot's amazement, there seemed to form in his head a thought—at first vague; then quickly it took on definite form.

"Man of Earth," it seemed to say, "we thank you—you have saved our nation"—(there seemed to be a name idea here, but a name is merely a phonetic symbol for a country, just as a flag is its material symbol. It can not be impressed on the brain of one who has different physical arrangements, as can an idea, for ideas are everywhere the same.)

"We want to thank you for your quick response to our signals. We had not thought that you could answer us so soon." The Venerian seemed to relax as the message was finished. It was obviously a great effort.

Arcot looked steadily into his eyes now, and tried to concentrate on a message—on a series of ideas. To him, trained though he was in deep concentration on one idea, the process of visualizing a series of ideas was new, and very difficult. But he soon saw that he was making some progress.

"We came in response to no signals—exploration only—we saw the battle—and aided because your city seemed doomed, and because it seemed too beautiful to be destroyed."

"What's it all about, Arcot?" asked Morey in surprise, as he watched them staring at each other.

"These Venerians have developed telepathy to a practical point—it seems I am terribly thick from his point of view, but I just learned that they sent signals to earth—why, I haven't learned—but I am making progress. If I don't get a headache or go insane from the overwork, I will find out sooner or later—so wait and see." He turned again to the Venerian who was now looking at him rather dubiously. Then quickly he turned to his desk, and pulled a small lever down. Then again he looked intently at Arcot.

"Come with me—the strain of this conversation is too great—I see you do not have thought transference on your world."

"Come along, Morey—we are going somewhere. He says this thought transference is too much for us. I wonder what he is going to do?"

OUT into the maze of halls they went again, now led by the kindly, seven-foot Venerian scientist. Down through a long series of halls they went, till at last they reached a large room, where already there had gathered in the semicircle of seats a hundred or so seven-foot Venerians. Before them, on a low platform, there were two large chairs with deep cushions. To these chairs the two Terrestrians were led.

"We will try to teach you our language telepathically. We can teach you the ideas—you must learn the pronunciation, but this will be very much quicker. Seat yourselves in these chairs and relax."

The chairs had been designed for seven-footers. These men were six feet and six feet six, yet it seemed to them, as they sank into them, that never had they felt such comfortable chairs. They were designed so that every muscle and every nerve should be at rest. Now they seemed floating in space once more, without weight. Suddenly Arcot felt a wave of sleepiness oppress him; then slowly

he grew more and more sleepy—he was tired—tired. It seemed that suddenly visions began to fill his mind—visions as he regained consciousness slowly—up from the dark, and into a dream world. It seemed he saw a mighty fleet of gargantuan planes flying above the city where he was—a fleet whose individual planes were a mile long, three-quarters of a mile wingspread—titanic monoplanes, whose droning roar as the hundreds of whirling props stirred the air seemed to roar through all space. Then suddenly they were above him, and from each there spurted out a great stream of dazzling brilliance, an intense glow that reached down, and touched the city—There was an awful concussion in his ears. All the world about him was gone in a flash of awful brilliance; then all was dark.

Another vision it seemed now—a vision of the same fleet hanging over a giant crater of molten rock, a crater that nestled on a plain beside low green hills—a crater that he knew had been a city. The giants of the air circled, turned, and sped far off over the horizon—Again he was with them—and again he saw a great city fuse in a blazing flash of blinding light—then again and again—around all that world he seemed to see smoking ruins of great cities, blasted red hot rock that had been cities, a world of awful desolation. Then he was with the Destroyers, riding up, up, up—out of the clouds they were, out beyond the swirling mists, where the cold of space seemed to reach in at them, and the roaring of the mighty propellers was a thin whine—then suddenly that was gone, and out of the rear of each of the titanic machines there burst a great stream of light, a blazing column of light that roared back, and lit all space for miles around—then the machines were shooting up, and away—out across space—away from the planet—on—on. Then he seemed to see them nearing another world, a world that shone a dull red, but he saw the markings and knew that it was earth, not Mars. The great planes were falling now—falling at an awful speed into the upper air of the planet, and in an instant the great light flares were gone, fading and becoming weaker as the dense air oppressed them. Now again there came the roar of the mighty propellers. Then swiftly the Fleet of Giants was dropping, and Arcot saw it sink lower and lower; his vision saw it coming above a spot he knew must be New York—but it was a strangely distorted New York; it was a Venerian city, where New York should have been—and again he saw great bombs falling. In an instant the gigantic city was a smoking ruin—then the visions faded, and slowly he opened his eyes, looked about him. He was still in the room of the circle of chairs—he was still on Venus—then suddenly to him came the meaning of these visions—the meaning of that strangely distorted New York, of that red earth. It meant that this was what the Venerians believed was to happen! They were trying to show him the plans of the owners and builders of those gigantic ships! The New York he had seen was the New York as these men imagined it.

Startled, confused, he rose unsteadily to his feet. His head seemed whirling in the throes of a terrific headache. The men about him were looking anxiously at him—he glanced toward Morey. He was sleeping deeply in the seat—now and then his face moved in some strange expression. It was his turn now to learn this new language and see the visions.

The old Venerian, who had brought them here, walked up to Arcot and spoke to him in a softly musical language, a language that was sibilant and predominated in liquid sounds; there were no gutturals, no nasals; it was a more musical language than earth men had ever before heard, and now Arcot started in surprise, for he understood it perfectly; the language was as familiar as English.

"We have taught you our language as quickly as possible—you may have a headache, but you must know what we know as soon as possible. It may well be that the fate of two worlds hangs on your actions.

"These men have concentrated on you and taught you very rapidly, given you those visions of what we know to be in preparation. You must get back to your wonderful ship as quickly as possible; no time can be lost, and you must know what has happened here on our world in the last few years, and what happened twenty centuries ago.

"Come with me to my office, and we will talk. When your friend has also learned, you may tell him."

QUICKLY Arcot followed the Venerian down the long corridors of the building. Few people they met, and these seemed intent on their own business, paying little attention to the strange man that walked through the halls with the tall old gentleman.

At last they were again in the office where Arcot had first seen the Venerian. They sat down, and Arcot listened to a new history—the history of another planet.

"Twenty centuries ago," the old man began ,"there were two great rival nations on this planet. The planet Turo is naturally divided so that there would be a tendency thus to form two great nations. There are two enormous belts of land around the globe, one running from about twenty degrees north of the equator to about eighty degrees north. This is my country, Lanor. To the south there is a similar great belt of land, of almost identical size, Kaxor. These two nations have existed for many thousands of our years—slightly over two-thirds of the time in your years—and two thousand years ago there was a great crisis in the affairs of the world—a great war was in process of starting—but a Lanorian developed a weapon that made it impossible for the Kaxorians to win—and war was averted. The feeling was so strong, however, that laws were made that have been able to stop all intercourse between the two nations for these thousands of years. Only we know that Kaxor has studied the principles of physics, perhaps in hopes of finding a weapon with which they could threaten us once more. Lanor has studied the secrets of the human mind, and of the body. We have no disease here any longer; we have no insanity. We have studied chemistry greatly, but physics only in connection with our other studies. Recently, however, we have again taken up the study of this science, since it alone of the main sciences had gone neglected. But twenty-five years have been spent on these researches, and in that short time we cannot hope to do what the Kaxorians have done in two thousand. The secret of the heat ray, the weapon that prevented the last war, had been nearly forgotten. It required diligent research to bring it to life again, for it is a very inefficient machine—or was. Of late, however, we have been able to improve it, and now it is used in commerce to smelt our ores. It was this alone that allowed this city to put up the slight resistance that we did. We were surely doomed. This is the capital of Lanor, Sonor. The nation would have fallen but for you.

"We have had some warning that this was coming. We have spies in Kaxor now, for we learned of their intentions when they flew one of the giant planes over one of our cities and dropped a bomb! We have been trying, since we discovered the awful scope of their plans, to send you a warning if you could not help us. That you should come here just now is one of the greatest things of the universe—a chance in a billion billion billion, I suppose—but perhaps there is more than chance behind it? Who knows?

"But since that plane has been driven away, we can expect at any moment a new raid, and we must be prepared. Is there any way you can signal your planet?"

"Yes—we can signal easily by—I do not know the word in your language—it may be that you do not have it—radio we call it—it is akin to light, but of vastly longer wavelength. Produced by electrical means, it can be directed like light by means of a reflector and sent in a beam. It can penetrate all substances except metals, and can leak around them, if it be not directional. With it I can talk readily with the men of earth, and this very night I will. But I want to learn of your planet. I will be able to warn our planet, but I will also want to tell them of yours. There is much to be gained by a knowledge of your planet and its resources!

"You say your people have studied chemistry. We have, too. And we have studied physics much, but we have studied the mind very little. The body we have studied, and we know enough to care for it. We, too, have well nigh eradicated diseases. But we have had a civilization of metals for many years now, and there are many metals we lack. This trip to your planet was partly in interest of finding more supplies.

"Here you use copper very lavishly. Is it plentiful?"

"On Turo," said Tonlos, "we have two elements which constitute a very large percentage of the available resources. Oxygen constitutes forty-two percent, and silicon about ten percent.

"Next in abundance is 'morlus,' which constitutes about 7 percent."

"*Morlus*—I have the word in your language—but I do not know the element. What is it?" asked Arcot.

"Why—here is some!"

Tonlos handed Arcot a small block of metal that had been used to hold a thin sheet of metal flat on a table in one corner of the room. It seemed a fairly dense metal, about as heavy as iron, but it had a remarkable blueish tint. Obviously, it was the element that composed the wings of the airplane they had seen that afternoon. Arcot examined it carefully, handicapped somewhat by the fact that he could not hold it directly, but only on a piece of cloth, since the metal was too hot. He picked up a small copper rod and tried to scratch it, but there was no noticeable effect.

"You cannot scratch it with copper," said Tonlos, "it is the second hardest metal we know—it is less hard than chromium, but far less brittle. It is malleable, ductile, very strong, very tough, especially when alloyed with iron, but those alloys are used only in very particular work, for iron is very rare. We have——"

"Iron is rare!" exclaimed Arcot in surprise. "Why, on earth it is exceedingly plentiful. I cannot understand how it can be so rare here on Venus. And I cannot identify this element. May I take it to the ship to test it?"

"You may, by all means. I thought from the appearance of some of your mechanisms that iron was very plentiful on your planet. But, from the fact that you do not recognize this metal of ours, I see that to you it is rare. You will have considerable difficulty getting it into solution. It is attacked only by boiling selenic acid, and that dissolves platinum readily. However, it is related to manganese. The usual test for the element is to so dissolve it, oxidize it to an acid, then test with radium selenate, when a brilliant greenish blue salt is——"

"Test with radium selenate! Why we have no radium salts whatever on earth that we could use for that purpose. Radium is exceedingly rare!" said Arcot.

"I think I had best go on with my list," Tonlos continued. "Radium is by no means plentiful here, but we seldom have to test for morlus, and we have plenty of radium salts for that purpose. We have never found any use for radium—it is so active that it combines with water just as sodium does, it is very soft—a useless metal, and dangerous to handle. Our chemists have never been able to understand it—it is always in some kind of a reaction no matter what they do, and still it gives off that very light gas, helium, and a heavy gas niton, and an unaccountable amount of heat.

"Next after morlus in quantity comes copper, then chromium, then calcium, beryllium, sodium and potassium, and lead, zinc and tin, all occuring over one percent. Then the the non-metals break in again—the most plentiful is carbon—then comes another metal, tungsten, .9 percent; then there is a long string of metals and non-metals that occur in very small quantities except for sulphur, selenium and platinum.

"We have large supplies of platinum really—they all seem to come in lumps, not like some of them, that are spread out all over.

"But how about aluminum? and gold? and the halogens?" asked Arcot.

"Oh, aluminum is rather rare—we use it as a monetary standard—it is hard enough to make good coins. It seems a pity it is so rare; it is a very useful metal. And what surplus there is is used as ornaments by women and in very expensive things. It is a luxury which would make a very useful necessity if it were more plentiful. Gold—oh, yes—I had forgotten it. It is always bothering the platinum workers—and it occurs all over, it seems. It is a terrific nuisance. It is not exceedingly plentiful—less than half of one percent—but widely distributed. It is soft and sticky, so to speak. It clogs up things, and is no use whatever. It is too soft to hold together. We have tried to use it for plating since it is non-corrosive, but it wears off right away. It won't stand heat, so we can't use it in the laboratories. We have tried using it in acid chambers, but it 'poisons' many catalysts and keeps them from working properly. We cannot use it near the platinum catalysts in the sulphuric acid plants—so we use lead all over. We do use it in the concentrating pans sometimes—but it isn't worth the trouble of digging it out of the ground and hauling it here. I don't believe anyone has ever tried to develop a use for it, though it is plentiful enough I suppose. It is naturally very cheap, and unscrupulous people use it in copper to make it weigh heavier. It can be had from platinum works for the trouble of hauling it away. The halogens are very rare. We use them only as very unusual reagents. A very small percentage of them is a requisite to life processes, but very, very little. They occur to a small extent in sea water.

"Your world is vastly different from ours," said Arcot. He related to Tonlos the different metals of the earth, the non-metals, and their occurrence. But try as he would, he could not place the metal Tonlos had given him.

AT last Morey was brought in. He was looking very tired, and very serious. He, also, was suffering from a headache, just as Arcot had. Arcot told him of his discoveries and of the metals of Turo, wondering why it was that the two planets, both members of the same sun, should be so different.

"I think I know," said Morey slowly, "and the more I think it over, the more firmly convinced I am that I know the metal you can't place.

"We have all seen pictures of the sun taken by different colored lights. If hydrogen light is used and all others are shut out, we see a picture of the hydrogen on the sun. If calcium light is used, a corresponding result is obtained.

"This work was started back as far as 1900 or so, and in that time lots of elements have been mapped, and we have watched the elements change their locations. In this way we are getting a map of the sun showing the deposits of the different elements. We have seen hydrogen, oxygen, silicon and others, and as the sun aged, the elements must have been mixed up more and more thoroughly. Yet we have seen the vast deposits. Some of those deposits are so vast that they could easily be the source of an entire world! I wonder if it is not possible that earth was thrown off from some deposit rich in iron, aluminum and calcium, and poor in gold, radium and those other metals—and particularly poor in one element. There are some gaps in the periodic table—you know them—there is a counterpart to manganese, a heavier metal still to be found. We have located in the sun the spectrum of an element we have named coronium—and I think that you have a specimen of coronium in your hand there! Venus came from a coronium impregnated region!

"Most of the meteorites that fall to earth have a large iron content—but remember that earth was thrown out of the sun violently, whenever it was thrown out, and with it must have come a lot of loose material that may have been thrown out and shot out into space to form long elliptic orbits that bring them near the sun once in a billion years. These pieces are really part of the earth that fall back to it as it advances in its orbit—naturally they will be high in iron—like the earth—and scientists observing them say, 'Ha—meteorites are full of iron—all planets must be full of iron!' But their logic is being unbalanced by errors, hidden by Nature. My idea sounds possible—and it does explain the facts of Venus."

"Most of the meteorites that strike this planet are high in iron, too—but the sun is in general, too. However, we get many meteorites high in coronium, as you call it," said Tonlos.

The discussion was soon ended, for already the air outside had passed to a murky twilight. It was nearing night now, and the Terrestrians were led quickly down to the elevator, which dropped them rapidly to the ground. There was still a large crowd about the *Solarite,* but the way was at once cleared for them, and a peculiar sensation struck both the Terrestrians very forcibly. It seemed that everyone in the crowd was wishing them the greatest success—the best of things in every wish.

"The ultimate in applause! Morey, I'll swear we just received a silent cheer!" laughed Arcot, as they stood inside the airlock of the ship once more. It seemed home to them now! In a moment they had taken off the annoying ventilating suits and stepped once more into the room where Wade and Fuller awaited them.

"Say—what were you fellows doing. We were actually getting ready to do some inquiring about your health!" said Wade, still a bit worried.

"I know we were gone a long time—but when you hear the reason, you won't wonder so much! See if you can raise earth on the radio yet, Morey, will you, while I tell these fellows what happened? If you succeed, tell them to call in Dad and your father, and to have a couple of phono-type machines on the job. We will want a record of what I have to send. Say that we will call back in an hour." Then, while Morey was busy down in the power room sending the signals out across the forty million miles of space that separated them, Arcot told Wade and Fuller the news that he had learned. Not only was half of Venus in danger—but earth itself was for the first time in millions of centuries in danger of attack!

Morey finally succeeded in getting his message through, and returned to say that they would be waiting in one hour. He had had to wait eight minutes after sending his message to get any answer, however, due to the slowness of radio waves.

"Fuller—you're the chef—if you do your job, Wade and I will start on this piece of coronium here and see what there is to learn," said Arcot. "We can be ready by the end of the hour."

At supper table Wade and Arcot were exclaiming over the curious constants they had discovered for coronium. It was not attacked by any acid except boiling selenic acid, since it formed a tremendous number of insoluble salts. Even the nitrate violated the long-held rule that "all nitrates are soluble"—it wouldn't dissolve. Yet it was chemically more active than gold.

But its physical constants were the most surprising. It melted at 2800 centigrade, a very high melting point indeed. Very few metals are solid at that temperature. But the tensile strength test made with a standard bar they had finally turned out by means of a carbaloy tool, the second hardest thing known, tungsten carbide and cobalt, gave a reading of over a million, three hundred thousand pounds per square inch! It was far stronger than iron—stronger than tungsten, the strongest metal heretofore known. It was twice as strong as the earth's strongest metal!

"No wonder they can make a plane like that when they have such a metal to work with," said Fuller. The designing engineer had visions of a machine after his own heart—a machine where half the weight wasn't employed in holding it together.

It was a little later that they got communication through to earth, and the men went to the power room. The televisor was blinking, struggling to form a clear image despite the handicap of forty million miles of space. In a moment it had cleared, though, and they saw the face of Dr. Arcot. He showed plainly that he was worried about the startling news that had reached him already, sketchy though it was. Rapidly his son outlined to him the full extent of their discoveries, and the things that earth would have to meet with.

"Dad, these Kaxorians have planes capable of far more than a thousand miles an hour in the air. For some

reason the apparatus they use to propel them in space is inoperative in air, but their giant propellers will drive them forward faster than any plane earth ever saw. You must start at once on a fleet of these molecular motion planes—and a lot of the gas Wade developed—you know how to make it—the animation suspending gas. It will be useful—and I will try to develop some new weapon here. If either of us makes any progress along new lines—we will talk each night—I must stop now—some Lanorian scientists are coming."

WHILE the *Solarite* rested, there had been a large crowd of people gathered around it, waiting a glimpse of the Terrestrians—for now the news had spread that this car had come from earth. Now, however, a group of men was advancing toward the car, they were clothed in great furs, heavy coats that seemed warm enough to wear in the arctic regions!

"Why—Arcot—what's the idea of the arctic regalia?" asked Fuller in surprise.

"Think a moment—they are going to visit a place whose temperature is seventy degrees colder than their room temperature. Into the bargain, Venus never has any seasonal change of temperature, and the heavy bank of clouds that eternally cover the planet keep the temperature as constant as a thermocouple arrangement could. The slight change there is from day to night is only appreciable by the nightly rains—see—the crowd is beginning to break up now—it is night already, and there is a heavy dew settling now, soon it will be rain, and the great amount of moisture in the air will supply enough heat, in condensing, to prevent a temperature drop of more than two or three degrees.

"These men are not used to changes in temperature as we are and hence they must protect themselves far more fully. Even in exploring their arctic, I imagine they never find frozen water—the heat held in by the clouds prevents that."

Three figures now entered the air-lock of the *Solarite*, and muffled in their furs as they were, large under any conditions, they had to come through one at a time.

Much that Arcot showed them was totally new to them. Much he could not explain to them at all, for their physics had not yet reached that stage.

But there was one thing he could show them, and he did. There were no samples of the liquids he wanted, but their chemistry was developed to a point that permitted the communication of the necessary data and Arcot told them the formula of Wade's gas.

This gas was somewhat radioactive in character due to the incorporation in the molecule of an atom of the radioactive thorium, but partly due to this, it had the wonderful property of suspending animation for several months, and of permitting full recovery on the administration of a dose of potassium iodide. There was a second equally striking peculiarity—it could penetrate any material. It had been known for many centuries that carbon monoxide was able to penetrate a sheet of steel when the steel was at a dull red heat, but Wade had found the reason for this property, and developed it to a far greater degree, till the gas he made was able to penetrate any material at ordinary temperatures. Combined with its anesthetic properties, it had obvious advantages as a gas for rendering the opposing forces defenseless.

Since it was able to penetrate all substances, there were no means of storing it—like the famous universal solvent—"what'cha gonna keep it in?" The answer was that two liquids were made to react spontaneously and produce the gas, which was then projected as any other to the spot where needed.

Arcot asked now that the Venerian chemists make him a supply of these two liquids. He felt he would be much better equipped to attack the enemy if he could but capture one of their flying forts. It seemed a strange task! Capturing so huge a machine with only the tiny *Solarite*—but Arcot felt sure he would be able to do it, if he but had a supply of that gas.

There was one difficulty—it required a considerable portion of chlorine gas to make it—though the chlorine itself was not part of the product; one step in the synthesis required it. Since chlorine was rare on Venus, the men were forced to sacrifice most of their salt supply, but this chlorine so generated could be used over and over again. Realizing the importance of the gas, the Lanorians agreed to synthesize it.

It was quite late when the Venerians had left, to go again into the hot drizzle of the rain. The rain was, as Arcot found, really scaldingly hot, but to these Venerians it appeared as a cold drizzle. But it was as natural to them as was the air, the ocean or the sunshine. They merely accepted it as one of the things that were.

The building before which the *Solarite* now rested was the capital building of Lanor. There were here the government laboratories and the National College. With the help of these two institutions, it was hoped that the work of making the necessary materials would progress rapidly.

Shortly after the Venerians left, the Terrestrians turned in for the night, leaving a telephone connection with the guard outside. In view of the tremendous results the *Solarite* would bring into the balance of this war, Lanor had had a special guard established about it.

The dull light of the Venerian day was filtering in through the windows the next morning when the Terrestrians awoke. It was eight o'clock, New York time, but Sonor was working on a twenty-three hour day. It happened that Sonor and New York had been in opposition at midnight two nights ago, which meant that it was now ten o'clock Sonorian time. The result was that Arcot and Morey, the first up, found the Venerian world in full swing of its morning business. Quickly they called the others, and while Fuller was preparing the morning meal, Arcot left the car to speak to the officer in charge of the guard about the ship.

"We need some pure water—water free of copper salts. I think it would be best if you can get me some water that has been distilled. That is, for drinking. Also we need about two tons of water of any kind—the ship's tanks need recharging. I would like about a ton of the drinking water." Arcot had to translate the Terrestrian measures into the corresponding Venerian terms, of course, but still the officer seemed puzzled. Such a large amount of water would mean a real problem in getting it here. Could the *Solarite* be moved to some mere accessible place?

Arcot agreed to have it moved to a spot just outside the city, where the water could be procured directly from a small stream. The drinking water would be ready when he returned to the city.

The *Solarite* was moved to the shore of the little river

and the electrolysis apparatus was set up beside it. During the previous day, and ever since they had landed on Venus, all their power had been coming from the storage cells, but now that the electrolysis apparatus was to establish such a heavy and constant drain, Arcot started the generator, to both charge the cells, and to do the work needed.

THROUGHOUT the day there was the steady hum of the generator in its room, and the throb-throb-throb of the oxygen pump, as the gas was pumped into the huge tanks. The apparatus they were using produced the gas very rapidly, but it was near nightfall before the huge tanks had again been filled. Even then there was a bit more room for the atomic hydrogen that was simultaneously formed, although twice as much hydrogen as oxygen was produced. Then the *Solarite* rose again and shot swiftly toward the distant city.

There was a soft red glow now, for even through the miles of clouds the intense sun was able to give some direct rays, and all the city was lighted with that warm glow. The floodlights had not yet been turned on, but the great buildings looming high in the ruddy light were wonderfully impressive, the effect being heightened by the cooperation shown, for there were no single spires, only a single mass that grew from the ground to tower high in the air, like some man-made mountain.

The Venerian buildings had a slightly different type of architecture, in that, though the vertical lines were always accentuated to lead the eye upward, to increase the effect of height, the horizontal lines were even further reduced by making them all curves. There were no angles, the entire outside was curving. The effect was much more pleasing than the sharp angles of Terrestrial buildings.

Back at the Capital the *Solarite* again settled into the broad avenue that had been cut off now, and allotted to it as its resting place. Tonlos met them shortly after they had settled into place, and with him were five men, each carrying two large bottles.

"Ah-co," as Tonlos pronounced the Terrestrian name, "we have not been able to make very much of the materials needed for your gas, but before we made any very great amount, we tried it out on a Venerian animal, whose blood structure is the same as ours, and found it had the same effect, but that in our case the iodide of potassium is not as effective in awakening the victim as is the 'sorlon.' I do not know whether you have tried that on Terrestrial animals or not. Luckily sorlus is the most plentiful of the halogen group; we have far more of it than of chlorine, bromine or iodine."

"Sorlus? I do not know of it—it must be one of the other elements that we do not have on earth. What are its properties?"

"It, too, is much like iodine, but is heavier. It is a black solid melting at 570 degrees; it is a metallic looking element, will conduct electricity somewhat, oxidizes in air to form an acidic oxide, and forms strong oxygen acids. It is far less active than iodine, except toward oxygen. It is very slightly soluble in water. It does not react readily with hydrogen, and the acid where formed is not as strong as HI."

"I have seen so many new things here, I wonder if it may not be the element that precedes niton. Is it heavier than that?"

"No," replied Tonlos; "it is just lighter than that element you call niton. I think you have none of it."

"Then it must be the next member of the halogen series, Morey. I'll bet they have a number of those heavier elements," said Arcot.

Later work identified sorlus as number 85, and morlus as number 93! There are but 92 elements possible on the table, as earth knows them, but Venus has several very rare, and some highly radio-active elements, that earth does not have. Their table stops at a more logical place than does our Terrestrial table. They know of a heavy inert gas, number 104.

The gas was loaded aboard the *Solarite* that evening, and when Wade saw the quantity that they had said was "rather disappointingly small" he laughed heartily.

"Small! They don't know what that gas will do! There is enough stuff there to gas this whole city out of business. Why, with that we can bring down any ship! Tell them to go on though, we can use it on the other ships."

Again that night they spoke with earth, and Morey, Senior, told them that work was already under way for a hundred small ships. They were using all their own ships already, while the Government got ready to act on the idea of danger. It was a little hard to convince them that someone on Venus was getting ready to send a force down to earth to destroy them. However, the ships now under construction would be ready in three weeks. They would be unable to go into space, but they would be very fast, and capable of carrying large tanks of the gas-producing chemicals.

It was near midnight, Venerian time, when they turned in. They must start the next day for the Kaxorian construction camp. They had learned from Tonlos that day that there were but five of the giant planes ready to work now, but there were fifteen more under construction to make up the fleet of twenty that was to attack earth. These fifteen others would be ready in one week—or less. When these were ready, the *Solarite* would stand small chance. They must capture one of the giants and learn its secret, and then, if possible fight them.

Their opportunity came sooner than they had hoped for—or wanted. It was about three o'clock in the morning when the telephone warning hummed loudly through the ship. Arcot answered.

Far to the east and south of them the line of scouts that hung in their little planes over all the borders of Lanor had been broken. Instantaneously almost, out of the dark, its lights obscured, the mighty machine had come, striking the tiny scout plane head on, destroying it utterly before the scout had a chance to turn from the path of the titanic ship. But before the plane was destroyed the pilot had had a chance to light a magnesium flare, a blindingly brilliant flare that floated down on a parachute, and in the blaze of white light it gave off, the other scouts at a few miles distance, had seen the mighty bulk of the Kaxorian plane. At once they had dropped to the ground, and then, by telephone lines, they had sent their message to far off Sonor. The plane they had seen had no doubt been heading for the capital!

At once Arcot turned to the others and cried to them to get up at once. There was some real action to be had now! All day they had been doing so little toward the thing they knew must come, the battle for two worlds, they had wanted action, but they had no weapons except their invisibility and the atomic hydrogen. It would not sink a plane. It would only break open its armor. If it did sink them, they could learn nothing from it, for it

would be the very things they wanted to learn about that they would have destroyed.

ARCOT lifted the *Solarite* at once high into the air, and started toward the point on the border, where the plane had been seen crossing. In a short time Wade relieved him at the controls while he dressed.

They had been flying on in silence for about an hour, when suddenly Wade made out in the distance the great bulk of the plane, against the dull grey of the clouds, a mile or so above them. It seemed some monstrous black bat flying there against the sky, but down to the sensitive microphone on the side of the *Solarite* came the drone of the hundred mighty propellers as the great plane forged swiftly along.

Just how rapidly these giants moved, Arcot had not appreciated until he attempted to overtake this one. It was going over a mile a second now! The ship had but to go its own length in about five-eighths of a second to do this. It was a lower speed to this monster; the individual molecules of air meant less to it. It made greater speeds, both by streamlining and through sheer power, such as nothing else could approximate.

The *Solarite* was hovering high above the dark ship now, the roar of the terrific air blast from the propellers below came up to them here as a mighty wave of sound that made their ship tremble! The hundred gigantic propellers roaring below, however, would distribute their gas perfectly.

"I am going into invisibility. Look out!" There was a click as the switch shut, and the *Solarite* was as transparent as the air about it. Now Arcot dived the ship swiftly in front of the mighty colossus, then pulled a small switch shut. There was a low hiss from the power room—barely detectable despite the vacuum that shut them off from the roar of the plane for the whole ship trembled. The microphone had long since been disconnected. Out of the gas vent now a thin stream of a purplish gas was streaming, becoming visible as it left the influence of the invisibility apparatus, but only to those who knew where to look for it. Those men in that mighty plane could not see it—it was invisible to them as their machine bore down into the little cloud of gas—but an instant later the gigantic plane was wobbling in its course—it seemed uncontrolled! There was a sudden swerve that ended in a nose dive, straight to Venus seven miles below all the great propellers roaring, pulling it on. The pilot had fallen over his controls.

That the ship should crash nose on into the ground below was not at all Arcot's plan, and he was greatly relieved as the plane, an instant later, when the rapid fall had removed the weight of the man on the controls, and permitted the plane to balance itself, coming again under normal conditions, flattened its dive, and started to climb up, its titanic mass rapidly absorbing its kinetic energy. Down from its seven-mile height it glided, controlling itself perfectly as Arcot released the last of the first four bottles of the liquid gas makers, putting to sleep the last man on the ship below.

In a long glide that carried it over many miles, the great ship came down. It had sunk far, and gone smoothly, but now there loomed ahead of it a range of low hills! It would certainly crash into the rocky cliffs ahead—nearer and nearer it came—it might skim above those low hills at that—but just then there was a little dip, and head on, at nearly two thousand miles an hour, the titanic machine crashed into the rocks. Arcot had snapped the loud speaker into the circuit once more, and now as they looked at the sudden crash below, there came slowly to them the mighty waves of sound!

The giant plane had hit the top, twenty feet or so of a nearly perpendicular cliff. There was a terrific crash that was felt by seismographs in Sonor nearly two thousand miles away! The mighty armored hull plowed its way into the rocks like some gigantic meteor, the hundreds of thousands of tons crushing the rocky precipice like tissue paper, grinding the rocks to powder, and shaking the entire hill. The cliff seemed to buckle and crack. As the terrific momentum of the huge plane struck it, it was torn and twisted. In an instant the plane had been brought to rest, but it had plowed through twenty feet of rock for nearly an eighth of a mile. For an instant it hung there, perched perilously in the air, its tail hanging out over the little valley below, then slowly, majestically it sank, to strike with a reverberating crash that broke the heavy armor plate like a match-box! For an instant longer the great motors continued working, the roar of the propellers like some throbbing background to the rending crashes as the titanic wreck came to rest. Suddenly there was a series of crashing explosions, and one after the other, the entire series of motors in the left wing blew up with awful force. There was a flash of light that could be termed a blast; the terrific brilliance seemed to blind the Terrestrians watching this scene of awful desolation; then there came to the microphone such waves of sound as it could not record; the *Solarite* seemed to jump with each successive explosion. There was no dust at first, only they could see a fused mass of metal that they knew had been the wing, broken, rent, smashed where each of the fifty motors had been. The rocks beneath seemed powdered now, as a great cloud of dust rose. Still the motors on the other side of the ship were roaring and the giant propellers turned. It was these that blew the dust away. The Terrestrians stared in unbounded amazement as they saw playing from the gaping, broken wing a mighty beam of light of such dazzling intensity that Arcot at once restored them to visibility that they might shut it out. There was a terrific hissing, crackling roar. The plane seemed to wobble as it lay there, recoiling from that stream of flaming gas, it seemed. Where it touched the cliff there was intense incandescence that made the rock glow white hot, and from it rose clouds of vapor—BOILING ROCKS! For five minutes longer this terrific spectacle lasted, while Arcot withdrew the *Solarite* from the plane. The fifty motors of the remaining wing seemed slowing down now—then suddenly there was such a crash and towering flash of light as no human being had ever seen before! Up—up into the very clouds it shot its mighty flame, a blazing column of light that seemed to reach out into space. The *Solarite* was hurled back end over end, tumbling, falling. Even the heavy gyroscopes could not hold it for an instant, but quickly the straining hum of the motors brought the *Solarite* to rest in air that whirled and whined about them. They were over twenty miles from the scene of the explosion, but even at that distance they could see the glow of the incandescent rock. Slowly, cautiously they maneuvered the *Solarite* back to the spot, and looked down on a sea of seething fluid rock!

"Lord—what power that thing carries! No wonder they can support that gigantic thing in the air! How can they keep such awful power under control? There

is no trace of that giant plane! What titanic forces they use! We can never bring down a ship that way and examine it!" Morey was looking at the glowing rocks in awe-struck wonder. Was it possible that what they had seen was true—it was no dream? Such forces as they had seen were powers to make a world with, to fling out of space a blazing sun—these were no such forces as man should use!

Slowly Arcot was drawing away—off into the night—into the kindly darkness once more.

"I wonder what those forces were—they are greater than any man has ever before seen! An entire hill was fused to molten, incandescent rock, let alone the tons and tons of metal that made up that ship.

"And such awful forces as these are to be released on our earth!" Slowly Arcot continued his way. For many seconds they sat silent as the panorama of hills glided by at a slow two-hundred miles an hour. "We must capture a ship. We will try again—we will either destroy, or capture it—and either is to our advantage!"

FOR miles they continued thus leisurely on across the vast plain. There were no great mountains on Venus, for Venus had known no such violent upheaval as the making of a moon. They seemed lost in thought, each on his own line. At last Wade stood up, and walked slowly back to the power room.

Suddenly the men in the control room heard his call:

"Arcot—quick—the microphone—and rise a mile!"

The *Solarite* gave a violent lurch as it shot vertically up a mile at tremendous acceleration. Arcot reached quickly over and snapped the switch of the microphone—suddenly there came to their ears the familiar roaring drone of a hundred mighty propellers. No slightest hum of motor, only the vast whining roar of the mighty propellers.

"Another one! They must have been following the first by a few minutes. We will try to get this one!" Arcot was working swiftly at his switches. "Wade—strap yourself in the seat there—don't take the time to come up here."

The *Solarite* dived suddenly in front of the great plane, and as the nose dipped, it was invisible. They were rushing along before a mighty giant again, they were drowned in a titanic wave of rushing sound—then again came the little hiss of the gas. Now there were no hills in sight, as far as the eye could reach. In the dim light that seemed always to filter through these grey clouds they could see many miles.

It seemed several minutes before there was any effect; these men of earth were waiting for that great ship to move, to wobble from its course. Suddenly Arcot gave a cry of surprise, startled amazement was written all over his face, as his companions turned in wonderment to see that he was partially visible! The *Solarite*, too, was a misty ghost car about them; they were becoming visible! Then in an instant it was gone—and they saw that the huge black bulk behind them was wavering, turning; the motors had suddenly died till the thunderous roar of the propellers was a whistling whine; the ship was losing speed! It dipped, and shot down a bit—gained speed, then step by step it glided down—down—down to the surface below. The great engines were idling now, and the great machine was running more and more slowly—its landing speed was surprisingly low—slower and slower it went—they were near the ground now—would this ship, too, crash? Would it, too, be lost in a terrific holocaust that left the very rocks it crashed in a molten, boiling cauldron? It was within a half mile of the ground now—then it dipped once more, and Arcot breathed his relief as it made a perfect landing, the long series of rollers on the base of the gigantic hull seemed to spring enough to absorb the shock of that titanic ship and the hundreds of thousands of tons of metal as they fell through a distance of ten feet. The mighty ship rolled smoothly along the ground—there were small streams in the way—a tree or two. But these were obstacles unnoticed by the gargantuan machine.

Its mighty propellers still idling slowly, the huge plane rolled to a standstill.

In an instant the *Solarite* had landed beside it, it seemed lost in the vast shadows of the mighty metal walls that loomed up beside it.

Arcot had left a small radio set with Tonlos in Sonor before he started on this trip, and had given him directions on how to locate the *Solarite* by its means. Now he sent a message to him, telling that the plane had been brought down, asking that a squadron of planes be sent at once.

Wade and Arcot were elected to make the first inspection of the Kaxorian plane, and clad in their cooling suits, they stepped from the *Solarite*, each carrying, in case of emergencies, a small hand torch, burning atomic hydrogen, capable of melting its way through even the heavy armor of the great plane.

As they stood beside it, looking up at the gigantic walls of metal that rose sheer beside them, hundreds of feet straight up, it seemed impossible that this mighty thing could fly, that it could be propelled through the air. In awed silence they gazed at its mighty bulk.

Then, like invisible pygmies beside some mighty prehistoric monster, they made their way along its side, seeking a door.

"Arcot—this is senseless—we cannot do this—the machine is so vast that it will take us half an hour of steady walking to circumnavigate it—we must go in the *Solarite* to find the entrance!" Wade gestured hopelessly at the vast hull.

It was well they followed Wade's plan, for the only entrance was from the top. There, on the back of the giant, the *Solarite* landed—its thousands of tons affecting the Titanic machine not in the least. There was a trap-door on the back of the plane that led down inside. However, the apparatus for opening this was all on the inside, so it was necessary to burn a hole in the door before they could enter.

What a sight there was for these men of earth. The low rumble of the idling engines was barely audible as they descended the long ladder to the interior of the gigantic hull.

It suggested no flying machine as they entered here; more it resembled some great power house, where the energies of half a nation were generated. They entered directly into a mighty hall that extended for a quarter of a mile back through the great hull, and completely across the fuselage. To the extreme nose it ran, and throughout there were scattered little globes that gave off an intense white light. The great room was lighted from end to end. There were translucent bull's-eyes obscuring the few windows.

All about, among the machine, lay men, dead they seemed, though the two Terrestrians knew that they

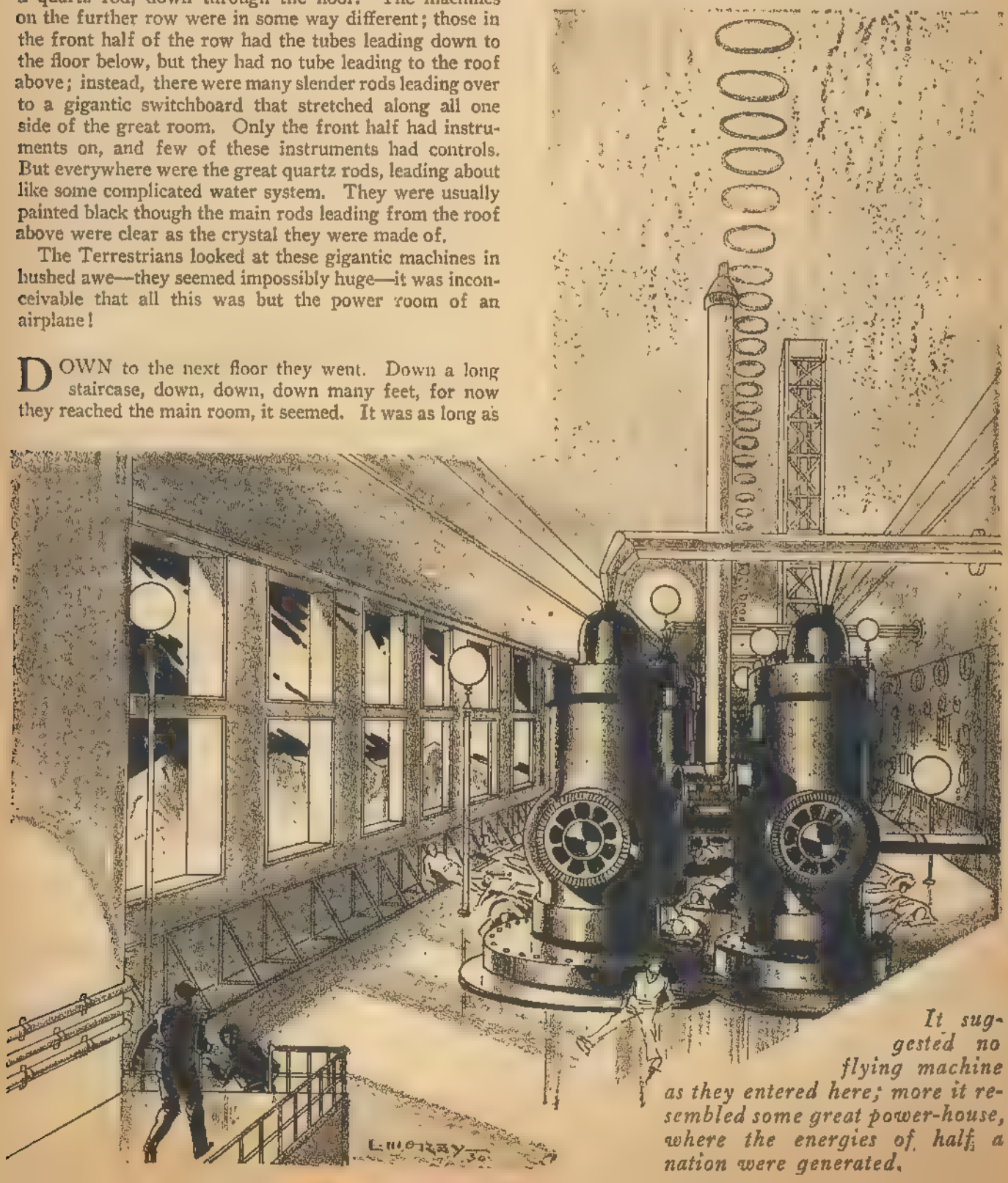
could be restored to life readily. The great machines they had been tending were humming softly, almost inaudibly. There were two long rows of them. Down all the great hall they were, mighty generators they seemed, generators that loomed twenty feet high, but from their peaks ran great tubes two feet thick of solid fused quartz. Then from these led other rods of fused quartz, rods that led down through the floor, but these were more slender; scarcely over eight inches thick.

The huge generator-like machines were disc-shaped, except that on one side of each there was a little cylinder at the center, like a bearing. From these, too, there ran a quartz rod, down through the floor. The machines on the further row were in some way different; those in the front half of the row had the tubes leading down to the floor below, but they had no tube leading to the roof above; instead, there were many slender rods leading over to a gigantic switchboard that stretched along all one side of the great room. Only the front half had instruments on, and few of these instruments had controls. But everywhere were the great quartz rods, leading about like some complicated water system. They were usually painted black though the main rods leading from the roof above were clear as the crystal they were made of.

The Terrestrians looked at these gigantic machines in hushed awe—they seemed impossibly huge—it was inconceivable that all this was but the power room of an airplane!

DOWN to the next floor they went. Down a long staircase, down, down, down many feet, for now they reached the main room, it seemed. It was as long as the one above, and higher, yet all that vast space was taken by one single, titanic coil that stretched from wall to wall! Into it, and from it there led two gigantic columns of fused quartz. That these were rods, such as those smaller ones above was obvious, but each was over eight feet thick!

Short they were, for they led from one mighty generator such as they had seen above, but magnified on a scale inconceivable! At the end of it, its driving power, its motor, was a great cylindrical case, into which led a single quartz bar ten inches thick, and this bar seemed



It suggested no flying machine as they entered here; more it resembled some great power-house, where the energies of half a nation were generated.

alive now with living, glowing fires, that changed and maneuvered and died out over all its surface and through all its volume. The motor was but five feet in diameter and a scant seven feet long, yet obviously it was driving the great machine, for there came from it a constant low hum, a deep pitched song of awful power. And the huge quartz rod that led from the titanic coil-cylinder was alive with the same glowing fires that played through the motor rod. From one side of the generator, though, there ran two things that were familiar, copper bus bars. But even these were THREE FEET THICK!

The scores of quartz tubes that came down from the floor above joined, coalesced, and ran down to the great generator machine, and into it. From it ran a similar quartz bar up to that front battery of machines that had been working upstairs, and these were alive with the strange force that lived.

Down again they went to another floor. Here were other quartz tubes, but these led down still further, for this floor contained individual sleeping bunks, and most of them were unoccupied, unready for occupancy, though some were made up.

Down another level; again the bunks, the little individual rooms.

At last they reached the bottom level, and here the great quartz tubes terminated in a hundred smaller ones, and each of these led into some strange mechanism. But there were sighting devices on it, and there were ports that men might see down. It was evidently designed as the bombing room.

Now the Terrestrians walked through the vast city of the dead to the front of the machine, and passed sleeping officers, and on the third level they came at last to the control room. Here were switchboards, control panels, and dozens of officers, sleeping now, beside the instruments they had been tending. There was a sudden thudding that made the earth men jump, as an automatic relay adjusted some mechanism.

There was one man stationed apart, at the very bow he sat, protected behind eight-inch coronium plates, but in them were set masses of fused quartz that were nearly as strong as the metal itself. These gave him a view in every direction except directly behind him. Obviously, here was the pilot.

To the top level they went again, and now they entered the long passages that led out into the titanic wings. Throughout, the ship was brightly lighted. Now they came to a small room, another bunk room. There were great numbers of these down both the sides of the long corridor, and along the two parallel corridors down the wing, but in the fourth corridor near the back edge of the wing, there were bunk rooms on one side, and on the other were bombing posts.

As they walked down the corridor further, however, along this first one, they soon came to a small room, whence came the low hum of one of the motors. Entering, they found the crew sleeping, and the motor idling.

"Good Lord! Look at that motor! Arcot—it's no bigger than the trunk of a man's body! Yet it can spin that huge propeller at a speed that will send this ship hurtling along at a mile a second! Just think of the awful power of that big thing driving the generator! And it had a ten-inch bar of quartz leading into it! What powers did those eight-foot quartz rods carry? No wonder that machine back there blew up so terrifically!" Wade was sobered by the thought of the titanic energies that were represented by these giant rods. Slowly they proceeded down the long hall. At each of the fifty engine mountings they found the same conditions. At the end of the hall there was a stairway that led one level higher, into the upper wing. Here they found long rows of the bombing posts and the corresponding quartz rods.

They returned finally to the control room. Here Arcot spent a long time looking over the many instruments, the controls, and the piloting apparatus.

"Wade, I think I can see how this is done. I am going to stop those engines, then start them, then accelerate them till the ship rolls a bit!" Arcot stepped quickly over to the pilot's seat, lifted the sleeping pilot out quickly, and settled in his place.

"Now you go over to that board there—that one—and when I ask you to, please turn on that control—no the one below—yes—turn it on about one notch at a time."

"All right Arcot—just as you say—but when I think of the powers you are playing with—well it isn't healthy to make a mistake!" laughed Wade. He was nervous, perhaps, but the excitement of the adventure, of controlling the awful forces there in the ship behind him—they were too much of an inducement!

"I'm going to stop the motors now." All the time they had been on board, there had been the low whine of the motors barely audible. Now suddenly, it was gone, and the plane was still as death!

"I did it without blowing the ship up after all—now one more—we are going to try turning the power on!"

SUDDENLY there was a throaty hum; then quickly it became the low whine; then, as Arcot turned on the throttle before him, he heard the tens of thousands of horsepower spring into life—and suddenly the whine was a low roar—the mighty propellers out there had become a blur—then with majestic slowness the huge machine moved off across the field!

The motors were shut off now as they made their way again up through the ship, up through the room of the titanic cylinder coil, and then into the power room. Now the machines were quiet, for the motors were no longer working.

"Arcot, you didn't shut off the biggest machine of all down there. How come?"

"I couldn't, Wade. It has no shut-off control, and if it did have, I wouldn't use it. I will tell you why when we get back to the *Solarite*."

At last they were out of the mighty machine, walking once more across the broad metal roof. Here and there they now saw the ends of those quartz tubes. Once more they were entering the *Solarite*, through the air lock, and taking off the cumbersome heat suits.

As quickly as possible Arcot outlined to the two who had stayed with the *Solarite* the things they had seen, and the layout of the titanic ship.

"I think I can understand the secret of all that power, and it is not so different from the *Solarite* at that. It, too, draws its power from the sun, though in a different way, and it stores it within itself, which the *Solarite* does not try to do.

"It has been known since the days of Einstein that mass is a representation of energy. It is a measure of energy, just as weight is a measure of mass. The amount of mass a body has depends solely on the amount of energy it contains. Thus, to say that a thing has a mass

of one gram is equivalent to saying it contains 900000000-000000000000 (9×10^{20}) ergs of energy. Similarly, the converse is true, and any energy, if it be that many ergs of energy, it has a mass of one gram no matter what form it has. That is the reason why a mass grows greater when it goes faster; it is acquiring kinetic energy, and hence more mass—the mass of the kinetic energy.

"Light is energy, and light, therefore, has mass. That is obvious when you stop to think of it. It exerts pressure, the impact of its moving units of energy—photons. We have electrons and protons of matter, and photons of light. Now we know that the mass of protons and electrons will attract other protons and electrons, and hold them near—as in a stone, or in a solar system. Now the new thing is that photons will attract each other in the same way—by the law of mass gravitation they will attract each other ever more and more powerfully, the closer they get. The Kaxorians have developed a method of getting them so close together, that they will, for a while at least, hold themselves there, and with a little 'pressure' they will stay there indefinitely.

"Wade, in that huge coil and cylinder we found there we saw the main power storage tank. That was full of gaseous light-energy held together by its own attraction, *plus* a little help of the generator."

"A little help? Quite a little! I'll bet that thing has a million horsepower in its motor!"

"Yes—but I'll bet they have nearly fifty pounds of light condensed there—so why worry about a little thing like a million horsepower? They have plenty more where that comes from.

"I think they go up above the clouds in some way and collect the sun's energy. Remember that Venus gets twice as much as the earth. They focus it on those tubes on the roof there, and they, like all quartz tubes, conduct the light down into the condensers where it is first collected. Then it is led down to the big condenser downstairs, where the final power is added, and the condensed light is stored.

"Quartz conducts light just as copper conducts electricity—those are bus-bars we saw running around there.

"The bombs we have been meeting recently are, of course, little knots of this light energy thrown out by that projector mechanism we saw. When they hit anything, the object absorbs their energy—and is very promptly volatilized by the heat of the absorption.

"Do you remember that column of hissing radiance we saw shooting out from the wrecked plane just before it blew up? That was the motor connection, broken, and shooting out its energy freely. That would ordinarily have supplied all fifty motors at about full speed. Naturally, when it got loose, it was rather violent.

"The main generator had been damaged, no doubt, so it stopped working, and the gravitational attraction of the photons wasn't enough, without its influence to hold them bound too long. All those floods of energy were released instantaneously, of course.

"Look—there come the Lanorians now. I want to go back to Sonor and think over this problem. Perhaps we can find something that will release all that energy—though honestly, I doubt it."

Arcot seemed depressed, overawed perhaps, by the sheer magnitude, the titanic brute force that lay bound up. It seemed inconceivable that the little *Solarite* could in any way be of avail against the gargantuan machine.

The Lanorian planes were landing, on the wings, the fuselage, the ground beneath all about the gigantic machine. Arcot stood gazing moodily through the window, looking at the mighty bulk that rose black and austere beside him, a mighty giant, stricken now, but only sleeping; in its vast hulk lay such energies as man had never before controlled; within it he knew there were locked the titanic powers of the sun itself. What could the *Solarite* do against it?

"Oh, I forgot to mention almost—in the heat of the fight back there it went almost unnoticed." 'Arcot was talking slowly, dejectedly.' "Our only remaining weapon—except the gas, is useless now. Do you remember how the ship seemed to lose its invisibility for an instant? I learned why when we investigated the great ship. Those men are physicists of the highest order. I must acknowledge that we must realize the terrible forces, both physical and mental that we are to meet. They have solved the secret of our invisibility, and now they can neutralize it. They know that we will no longer be able to use that. They began using it too late that time, but they had located the radio-produced interference, due to the ship's invisibility apparatus, and they were sending a beam of interfering radio energy at us. We are invisible only by reason of the vibration of the molecules in response to the radio impressed oscillations. The molecules vibrate in tune, at terrific frequency, and the light can pass perfectly. What will happen, however, if some one locates the source of the radio waves by means of a standard radio directional receiver? It will be a simple process to send a beam of radio waves along that same direction—and touch our invisible car with it. The two radio waves impressed on the car now will be out of step and the interference will instantly reveal the car. The huge ship there can get vastly more energy into their apparatus than we can get in ours and naturally they can make us visible. They will do so—and we can no longer attack them either with our atomic hydrogen blast, nor with the gas—it is useless unless we can get close to them, and we can not come within miles of them. Those bombs of theirs are effective at a distance of ten miles—above that they disintegrate automatically.

"We were protected from them as long as we were transparent, too, for the bombs could pass right through us just as they passed through the air. Only opaque bodies are susceptible."

AGAIN he fell silent, standing morosely at the window—thinking—hoping for an idea that would enable them once more to have hopes of winning.

"Wait a minute fellows—I'm going out to speak with the Commander-in-Field here. Then we can start back for Sonor—and maybe we had best start back for earth. It looks as though there is little we can do here."

Briefly he spoke to the young Venerian officer, and told him that the ship could be left there undestroyed if he would open a certain control just before he left. Arcot showed him which one—it would drain out the power of the great storage tank, throwing it harmlessly against the clouds above. The Kaxorians might destroy the machine if they wanted to—Arcot felt that they would not wish to. They would hope, with reason, that they might recapture it! It would be impossible to move that tremendous machine without the power that its "tank" was intended to hold.

Slowly they were cruising back to Sonor. Arcot was still standing by the window of the ship, thinking.

Would it be that Venus would fall before the attack of the mighty planes, that they would sweep out across space, to Earth—to—Mars—to other worlds, a terrific cosmic menace? Would the mighty machines soon be circling earth—defenseless—the greatest of the 30-inch rifles would be unable to more than dent that eight inch coronium armor. It was more than equivalent to twenty-four inches of steel. They would be invulnerable; the planes would be unable to get near enough to drop bombs on them. Only the molecular motion machines would even give them a battle! Perhaps these could be armored with twenty-inch steel walls, and driven in a suicidal dive into the great propellers, or at miles a second, into the ship itself! It was the only hope it seemed! But these ships would require long hours, days, even weeks to build, and in that time the Kaxorian fleet would be ready. It would attack earth within six days now! What hope was there?

In despair Arcot turned and strode quickly down the long hallway of the *Solarite*. Above him was the smooth, even hum of the sweetly functioning generator, but it could only remind him of the titanic energies he had seen led about that night. The thudding relays in the power room, as Wade maneuvered the ship, seemed some diminutive mockery of the giant relays he had seen in the mighty power room of the Kaxorian plane.

He sat down in the power room, looking at the stacked apparatus, neatly arranged, as it must be, to get all this apparatus in this small space. Then at last he began to think more calmly. Slowly he tried to think of the greatest forces man knew of—and there were only two that even occurred to him as great! One was the vast energies he had that very night learned of; the other was the force of the molecules, the force that drove his ship.

He had had no time to work out the mathematics of the light compression, and it was mathematics that would give results now he knew. There remained only the molecular motion. What could he do with it that he had not done?

He drew out a small black notebook. In it were symbols, formulas, and page after page of the intricate calculus that had ended finally in the harnessing of this great force that was even now carrying him smoothly along.

Half an hour later he was still busy—covering page after page with swiftly written formulas. Before him was a great table of multiple integers, the only one like it known to exist in the System, for the multiple calculus was an invention of Arcot's. At last he found the expression he wanted, and carefully he checked his work, excitedly though now, with an expression of eager hope—it seemed logical—it seemed correct——

"Morey—oh, Morey—if you can come here—I want you to do some Math for me—I have done it—and I want to see if you get the same result independently!" Morey was a more careful mathematician than he, and it was to him Arcot turned for verification of his new discovery.

Following the general directions Arcot gave him, Morey went through the long series of calculations—and arrived at the same result. Slowly he looked from the brief expression he had ended with——

It was not the formula that astonished him—it was the physical significance it had.

"Arcot—do you think we can make it?"

"I hope so, Morey. If we don't, Lanor is lost beyond a doubt—and probably the earth is, too. Wade—come here a minute, will you—let Fuller take the controls, and tell him to push it. We have to get to work on this."

Rapidly Arcot explained their calculations—and the proof he had gotten.

"Our beam of molecular motion-controlling energy directs all molecular motion to go at right angles to it. The mechanism so far has been a field inside a coil really, but if this is right, it means that we can project that field to a considerable distance even in air, a beam of power that will cause all molecules in its path to move at right angles to it, and in the direction we choose, by reversing the power in the projector. That means that *no matter how big the thing is, we can tear it to pieces*—we will use its own powers, its own energy, to rip it, or crush it. Imagine what would happen if we directed this against the side of a mountain—the entire mass of rock would at once fly off at terrific speed, several miles a second, crashing ahead with terrific power, as the molecules suddenly all moved in the same direction. Nothing in all the Universe could hold together against that! It is a disintegration ray of a sort—a ray that will tear, or crush, for we can either make one half move away from the other—or we can reverse the power, and make one half drive toward the other with all the terrific power of its molecules! It is omnipotent—hmm—but it has one limitation. Will it reach far in the air? In vacuum it should have an infinite range—in the air all the molecules of the air will be affected, and it will cause a terrific blast of icy air, air at temperatures far below zero! This will be even more effective on Venus! But we must start designing the thing at once! Take some of the Immorpho and give me some, and we can let the sleep accumulate till we have more time! Look—we are already in Sonor—we must land, Fuller—right where we were, and then come back here. We are going to need you!"

The gorgeous display of a Venerian dawn was already starting in the East as the great buildings seemed to rise silently about them. The sky, which had been a dull luminous grey, a grey that rapidly grew brighter and brighter, was now like molten silver, through which the early rays of the intense sun were filtering. Now, the sun rose above the horizon, invisible for clouds. But still it was traceable by the wondrous shell pink that began to suffuse the ten-mile layer of clouds. The tiny droplets were, however, breaking the clear light into a million rainbows, and all about the swiftly deepening pink there were forming concentric circles of blue, of green, orange, and all the colors of the rainbow, repeated time after time—a wondrous halo of glowing color, which only the doubly intense sun could give.

"It's almost worth missing the sun all day to see their sunrises and sunsets." The men were watching it, despite their need for haste. It was a sight the like of which no Earthman had ever before been privileged to see.

And then immediately they plunged into the extremely complex calculation of the necessary electrical apparatus to produce the necessary fields. To get the effect they wanted, they must have two separate fields of the director ray, and a third field of a slightly different nature, which would cause the director ray to move in one direction *only*. It would be disconcerting, to say the least, if the director ray, by some mistake, should work in the opposite direction!

THE work went on even more swiftly than they had hoped, but there was still much to be done on the theoretical end of the job alone when the streets about them began to fill. They noticed that a sizeable crowd was collecting, and shortly after they had finished, after some of those people had stood there over an hour and a half, the crowd had grown to great size.

"From the looks of that collection, I should say we are about to become the principals in some kind of a celebration that we know nothing about. Well, we are here, and in case they want us, we are ready to come.

The usual guard that always surrounded the *Solarite* had been doubled, and was maintaining a fairly large ring about the ship.

It was shortly after that that they saw one of the high officials of Lanor come down the walk from the governmental building, walking toward the *Solarite*.

"Time for us to appear—we may as well all show up for once. I'll tell you what they say afterward, Wade. They have gone to considerable trouble to get up this meeting, so let's oblige by all going out. I hate to slow up the work so, but we will make it short."

The four Terrestrians donned the cooling suits, and stepped outside the ship. It was the first time they had all been outside the ship together!

"Earthmen, we have gathered here this morning to greet you and thank you for the tremendous service you have done us. Twice you have saved this city from utter destruction. Across the awful void of empty space you have journeyed forty million miles from your planet to visit us, only in time to discover that Venerians were making ready to attack your world. Now you have helped us, saved our cities.

"There is, of course, no adequate reward for this service; we can in no way repay you, but in a measure we may show our appreciation. We have learned from the greatest psychologist of our nation, Tonlos, that in your world aluminum is plentiful, but gold and platinum are rare, and that morlus is unknown. I have had a small token made for you, and for your friends. It is a little plaque, a disc of morlus, and on it there is a small map of the Solar System. On the reverse side there is a globe of Venus, with a globe of earth beside it, as well as our men could copy the small globe you have given us. The northern hemisphere of each is shown—America, your nation, and Lanor, ours, thus being shown. We want you, and each of your friends, to accept these. They are both tokens of our great indebtedness to you, and symbols of your wonderful flight across infinite space!" The Venerians turned to each of the Terrestrians and presented each with a small metal disc, about three inches in diameter.

"On behalf of myself and my friends here, two of whom have not had an opportunity to learn your language, I wish to thank you for your great help at the time when we most needed it. You have saved more than a city—you have made it possible to save a world—your earth. But the battle here is but just begun. There are now in the Kaxorian camp eighteen great ships. They have been badly defeated in the three encounters they have had with the *Solarite* so far. But no longer will they be invulnerable. I have learned that the first plane, the plane which was first attacked by the *Solarite* is still undergoing repairs. They are patching the great hole that was melted into its side. That will be completed within two days, and then, when they can leave a base guard of two ships, they will attack once more. Furthermore, they will attack with a new weapon. They have destroyed the usefulness of our weapon, invisibility, and in turn, now have it to use against us! We must seek out some new weapon. I hope we are on the right track now, but every moment is precious, and we must get back to the work on it. This address must be short. Later, when we have completed the plans, we will have to give plans to your workmen, which you will be able to turn into metal, for we lack the materials. With this help we may succeed, despite our handicap."

The address was terminated at once. The Lanorians were perhaps disappointed, but they realized the necessity of developing all the powers they could.

"I wish Terrestrian orators spoke like that," remarked Morey as they returned to the ship. "He said all there was to say, but he didn't run miles of speech doing it. He was a very forceful speaker, too!"

"People who speak briefly and to the point generally are," Arcot said.

"Perhaps so, but it would be much more intelligible if you would tell me what these plaques they gave us are for. I hope they were gifts—they look expensive!" said Wade smiling at the little piece of blueish metal.

Arcot told him the gist of the speech as quickly as possible. Then they at once settled back to their work.

It was nearly noon that day before the theoretical discussion had been reduced to practical terms. They were ready to start work at once, but they had reason to work cheerfully now. Even through air they had found their ray would be able to reach 35 miles! They would be well out of the danger zone while attacking the gigantic planes of Kaxor.

Morey, Wade and Arcot at once set to work constructing the electrical plant that was to give them the necessary power. It was lucky indeed that they had thought to bring the great mass of spare apparatus! They had more than enough to make all the electrical machinery. The tubes, the coils, the condensers, all were there. The generator would easily supply the power, for the terrific forces that were to destroy the gargantuan ships of the Kaxorians were to be generated in the plane itself. It was to destroy itself; the *Solarite* was merely the detonator that set it off.

WHILE the Physicists were busy on this, Fuller was designing the mechanical details of the projector. It must be able to turn through a spherical angle of 180 degrees, and was necessarily controlled electrically from the inside. The details of the projector were worked out by six that evening, and the numerous castings and machined pieces that were to be used were to be made in the Venerian machine shops.

"Wade, come here and help me reduce this, will you?" asked Arcot. He was working with Fuller on the last details of the plans. They were putting in the dimensions that the Lanorians might understand.

"Their length unit, the 'tsorn,' is exactly 19.2 centimeters. I had a measuring rod here, and compared them—but the system is something like the metric—with this difference. Their entire mathematics is based on the duo-decimal system! Their unit, the tsorn, is divided into twelve parts, each an 'abtsorn,' and similarly multiplied to make an 'ortsorn.' Since their units are on the basis of twelve, they naturally have their lengths in a system based on twelve. Now we have to reduce the centi-

meters here on Fuller's drawings to equivalents in the tsorn system.

"Remember that a new system of numbers means a new multiplication table.

"They have digits that we don't have. They count 'or,' 'tel,' 'mur,' and so on, but in English they would say, one, two, three, and so on to nine. Then remember that for the next digit they have a single symbol. It happens to be something like this, /, and similarly eleven is √. They have twelve now, but they write it—well I can explain it better this way; it corresponds to 10. It means one times twelve. To them, 20 would mean two times twelve, or 24 units to us. Now 100 will mean twelve times twelve or one hundred and forty-four units. The difficulty comes in when we start multiplying. For instance, seven times five is thirty-five to us. They would write it, $7 \times 5 = 2\surd$—that is 'twenty-eleven' or two times twelve plus eleven. Now by the time you introduce such things as twenty-eleven, and eleventy-eleven into your system, the old decimal system looks sort of crippled! The thing we were working on just now was the problem of reducing .2 to the duo-decimal system. Of course, I could say 1/5 in either system, but I want to put it in a duo-decimal. Let's see—five into 1 goes .2 and two to carry—the next now is 4 and then 9 and then 7 and so it's a repeating decimal. The answer is .2497. Now let's go on."

The problem of working in a new multiplication system was decidedly time-consuming. It was hard to remember that 23 — 18 = 7 and similar peculiar things. But it was done, and at last the work was under way.

It was night soon, and still the Terrestrians were working. The Venerian workmen had promised to have the apparatus for them by ten o'clock the next morning —or what corresponded to ten o'clock. Their day was divided into twelve equal portions—sensibly, for their numbers were on the duo-decimal system. Wade had been curious to know why they had chosen that basis. It was, of course, as good as any other, and easy to work with, no doubt, when you were accustomed to it—but why twelve? Arcot pointed out that a Venerian has six fingers on each hand, just as a man has five. When man was learning to count, he used his fingers to keep track on, and so, no doubt, had the Venerians done. Naturally they counted by twelves.

That night Arcot sent to earth the full details of the new ray. If they did not succeed with it, or were in some way destroyed, earth would at least be able to build up the necessary apparatus.

The time passed quickly, and it was shortly after three o'clock that morning when they finally finished the apparatus and had the controls connected to the control room and the last of the projector directors in place; they were ready, all but the projector, and Morey, Wade and Fuller turned in to get what sleep they could before ten the next morning. But Arcot told them there was something he wished to get, and took another dose of the Immorpho, then stepped out into the steaming rain. It was necessary to wear gloves to prevent the hot rain from scalding him, though the heat suit covered him otherwise. Out into the rain he went, and across to the great government building. Then up quickly to the government chemistry laboratory.

Wade woke the next morning shortly before ten, and rose quickly, calling the others. Arcot would be back soon, so Fuller started the breakfast.

It was scarcely ten minutes later when Arcot did return, with half a dozen Venerians following him, each carrying a large metal cylinder in a special cradle. These were attached to the landing runners of the *Solarite*. The men inside watched with interest as the Venerians wired them on quickly and deftly. They were arranged, however, so that the fusing of one piece of wire would permit the entire thing to drop free, but it was virtually impossible for them to come free otherwise.

"What was that you were working on there, Arcot?" asked Wade as he entered the ship.

"It is an idea I want to try out—and I am going to keep it a deep dark secret for a while. I think you will get quite a surprise when you see those bombs in action! They are arranged to be released by turning current into the landing lights. We will have to forego them for the present, but I needed the bombs more than the lights just now. I think they will be successful. The current will melt the wire that holds the main wire supports together. There were no other connectors leading out through the wall of the ship, so I had to use them. The mechanics have finished working on those projector parts you designed, Fuller, and they will be over here in a short time. Here comes the little gang I asked to help us. You can direct them. They will weld the parts in place, and drill the holes for the wires where you say. You know where the best places will be, since you designed the ship, so you take charge of the gang. Hang it all—when they drill into the outer wall, we will lose the vacuum between the two walls, and all that hot air will come in. This place will be roasting in a short time, and we won't be able to walk comfortably for a week! Well, we have some molecular motion coolers.

"Oh, I wonder if we can't use the generator—oh no, I forgot that we had decided to isolate that from the main room by vacuum wall. Otherwise we could let it use the heat of the rooms. I think we had better charge up the gas tanks and the batteries as soon as this is done. Then tonight we will attack the Kaxorian construction camp. It will be best to attack them before they attack us again. I don't like the news I just got either. There have been no reports from the spies the Lanorians sent over—they are sure to spring some surprise on us soon! We had best get over there!"

SHORTLY later the sound of the drills, then the whistling roar as the air sucked into the vacuum, told the men inside that the work was under way. It soon became uncomfortably hot as, the vacuum destroyed, the heat came in through all sides. It was more than the little molecular motion coolers could handle. They had been designed to work in the ship which was being heated only by the heat of the human bodies. This was too much for them, and the temperature soon rose to about a hundred and fifteen. It was not as bad as the Venerian atmosphere, for the air seemed exceedingly dry, and the men found it possible to get along without cooling suits, if they did not work. Since there was nothing they could do as yet, they had no cause to be hot.

It was nearly dark before the men had finished their work, and the gas tanks had been recharged. All that time Arcot had spent consulting with Tonlos trying to get information about the position of the Kaxorian construction camp. Due to the long years that had passed since communications had been cut off with Kaxor, it was impossible to know much about the southern hemi-

sphere. However, the spies that had been at work in Kaxor had gotten several maps through to the Lanorian government. The difficulty came in that Kaxor had not mapped the northern hemisphere, and therefore the two maps could not be made to align themselves very exactly. The old maps helped a great deal, but still it was impossible to do very accurate work by these means.

It was finally determined that the Kaxorian construction camp was about 10,500 miles to the southwest. The *Solarite* was to start an hour after dark—they wanted to reach the camp just after nightfall, but since it was nearly four thousand miles to the west, it was necessary to wait an hour after dark in Sonor, and then make the trip, since it would be a three-hour trip, and they would in this way get there at the desired time.

They had no fear that they would miss the camp in the dark. Such a vast landing field as would harbor those giant machines was large enough to spot at night. The lights would be visible for miles around, no doubt.

The *Solarite* was moving swiftly along. The sky was slowly growing a bit lighter as they went toward the west. They were catching up on the sun. But now, as they saw the rolling ocean beneath them give way to low plains, they realized they were over Kaxorian land. The *Solarite* was flying very high, and as they showed no lights, and were not using the invisibility apparatus, they would be almost undetectable. Suddenly they saw the lights of a mighty city looming far off to the east.

"Kanor, pass well to the west of it. That is their capital." Wade was at the control, Arcot was to control the projector. Now he was telling Wade the directions to follow on his course to the berth of the giant planes.

The city had dropped far behind them now, and another, and another. They were entering a region of low hills, age-old folds in the crust of the planet, rounded off by untold ages of rains. Low they loomed against the grey horizon of the clouds.

"Easy, Wade. We are near now." Mile after mile they shot on at about a thousand miles an hour—then suddenly they saw far off to the east a vast light that reached into the sky, and seemed to paint itself on the clouds there miles above.

"There it is—off there—go high, and easy!"

Swiftly the *Solarite* climbed into the air. They were nearly five miles above the field now. Below them they saw a field. From this height all sense of proportions seemed lost. It seemed but an ordinary field, with eighteen ordinary airplanes resting on it. One of these now was moving, and in a moment it was rising into the air! But there seemed to be no men on all the great field. They were invisibly small from this height, and as they moved about the field, overshadowed by the titanic planes, they were lost.

"They are rising—look—there are men entering those other ships! Their surprise is that they have completed the ships far ahead of the time we expected! If all that armada gets in the air, we will be helpless despite our ray—we must destroy as many as we can before they leave the ground. They are grouped and we can destroy more in less time. Quick—drop to within a few hundred feet of the ground, and come in close to the field!"

The *Solarite* sank like a stone—down they shot with a sickening lurch, as they fell the distance of five miles to the ground below. There was a sudden tremendous weight as the ship was brought to rest not more than two hundred feet from the ground. Rapidly now Wade shot it in as close to the field as he dared. The planes loomed gigantic now, their true proportions showing clearly against the brilliant light of the field. There was one mighty wave of sound coming from the loud-speaker as the planes rolled across the ground to leap gracefully into the air—half a million tons of metal!

From the little ship there reached out a pale beam of ghostly light, a light that was faintly grey, tinged with red and green—the ionized air as the beam. In an instant the whirr of the hundreds, thousands of giant propellers was drowned in a terrific roar of air. Great snowflakes were falling from the air before them; it was white with the solidified water vapor. Then came a titanic roar and the planet itself seemed to shake! There was a crash, a snapping and rending as a mighty fountain of dirt and rock shot high into the air, and with it, twisting, turning, hurled in a dozen directions at once, twelve titanic ships were flying high into the air! For an instant there was a silence that was oppressive, as the ray was shut off. Then again there was a roar that slowly grew to a mighty cascade of sound as the millions of tons of rock and dirt fell back. Some of it had gone miles up. Now it came down, but not with the same speed it went up. In a few moments the ground was as it had been before apparently, except that it seemed newly turned, and over it all there lay a white blanket of ice and snow. But it was quickly dissolving.

HIGH above there were ten planes flying about in the air—suddenly one turned, headed for the ground far below, and was coming down at terrific speed, the wings screaming their protest as the motors pulled, ever faster, with the gravity of the planet aiding them. There was a rending, crackling crash as the wings suddenly bent back along the sides. An instant later the plane was falling freely; the wings falling, twisting, turning down.

The *Solarite* seemed to leap as from a gun as it shot swiftly away from the spot—away and up, with a force that nailed the occupants to the floor. Then behind them was a mighty gout of light that struck to the very clouds above, and all the landscape, for miles about, was visible in the glare of the released energy.

Back there on the plain was a great spot of loose dirt, and in the center a spot that glowed white, and seemed to bubble. It was molten.

Nine great planes were circling in the air, then of an instant they were gone, and no man could find them, but the *Solarite* was darting away with a speed that defied the aim of any machine.

High above the planes they went, for in the radio direction control Arcot could trace them. They were circling, searching for the *Solarite*.

The tiny machine was invisible in the darkness, but its invisibility could not be located by the radio detectors.

"Wade, how is it those ships can be invisible when they are driven by light, and have the light stored in them?" asked Fuller. "They are perfectly transparent. Why is it they can be made invisible without the light making them stand out?"

"They are storing the light. It is bound—it cannot escape. You cannot see light unless it literally hits you in the eye. That cannot reach you, for it is held by its own attraction and by the special field of the big generators there."

They seemed to be above one of the Kaxor planes now. Arcot caught the roar of the invisibility set.

"To the left, Wade—faster—hold it—left—ah!" Arcot pushed a button.

Down from the *Solarite* there dropped a little canister, one of the bombs that Arcot had prepared the night before. To hit an invisible target is ordinarily difficult, but when that target is far larger than the proverbial side of a barn, it is not very difficult, at that. But now Morey was watching for the crash of the explosion, the flash of light. What sort of bomb was it that Arcot hoped would penetrate that tremendous armor?

Suddenly there was a great spot of light—it seemed to spread with startling rapidity, a patch of light that ran, and moved. It was flying through the air at terrific speed. The light was a pale green that seemed to flow and ebb; it had a strange ghostly appearance.

For an instant Morey and the others stared in utter surprise at it. Then suddenly Morey burst out laughing.

"Ho—you win Arcot—that was one they didn't think of, I'll bet! You have them on that one, and they never will put that out!"

For an instant longer Wade looked in puzzled wonder; then he too saw the secret, and began laughing.

"Luminous paint—and by the gallon! You had enough to paint a city with. I suppose it is radium paint, and no man has ever found how to stop radium, so they are stuck—and that plane sticks out like a sore thumb! Their invisibility may make the paint invisible, but it can't make the light it gives out invisible!"

Indeed the luminous paint made the gigantic plane clearly visible now against the grey clouds. Visible or not, that plane was marked.

Quickly now Arcot tried to maneuver the *Solarite* over another of the invisible planes, for now the danger was only from those he could not see. Suddenly he had an idea.

"Morey—go back to the power room and change the adjustment on the meteorite avoider to half a mile!" At once Morey understood his plan, and hastened to put it into effect. The illuminated plane was diving, twisting wildly now. Suddenly Arcot focused his attention on it. The *Solarite* dived down toward it with sickening speed, then suddenly the gigantic bulk of the plane loomed off to the right of the tiny ship, the great metal hull, visible now, rising in austere power. They were too near, and Wade shot the machine to a greater distance—then again that ghostly beam reached out—and for just a fraction of a second it touched the giant plane.

The titanic engine of destruction seemed suddenly to be in the grip of some Colossus so far vaster than it, that it was but a fragile toy in the terrific grip—and he closed that grip! The great plane jumped back with a terrific crash, a mighty roar of rending steel, of torn metal and snapping beams. There was a sudden crash. For an instant there came the sound as of some mighty buzz-saw as the giant propeller of one wing cut into the body of the plane as it came crushing in upon it. Then, in that instant, the great power storage tank was split open. It seemed like the bursting of a world. The *Solarite* was hurled back with the force of an explosion that seemed to split the very atoms of the air, and all about them was a terrific blaze of intense heat and light that seemed to sear their faces and hands with the intense rays.

Then, in a time so short it seemed never to have happened, it was gone, and only the distant drone of the other ships' propellers came to them. There was no luminous spot. The radium paint had been destroyed in the only possible way—it was volatilized through all the atmosphere!

The Terrestrians had known what to expect; had known what would happen; and they had not looked at the great ship in that last instant. But the Kaxorians had naturally been looking at it. The men who had never seen the sun directly, they had been looking at it, and their eyes were lidless now, for their invisibility afforded them no protection. They were temporarily blinded; they could only fly a straight course in response to the quick order of their squadron commander.

And in that brief moment that they were unable to watch him, Arcot dropped two more bombs in quick succession. Two bright spots stuck out in the black night. No longer did these planes feel themselves invulnerable, able to meet any foe! In an instant they had put on every last trace of power, and at their top speed they were racing west, away from their tiny opponent—in the only direction that was open to them.

But it was useless. The *Solarite* could pick up speed in half the time they could, and in an instant again Arcot was training the beam on the mighty splotch of light that was a fleeing plane. These planes, which had been invulnerable through sheer size, were helpless now. Through their very mass they were slow in pickup, and the lightning-fast *Solarite* was bearing down on them.

Out of the dark came a ghostly beam, for an instant of time so short that before the explosive shells of the other could be trained on it, the *Solarite* had moved, and before it the mighty plane was crumpling, splintering under the titanic driving blow of the great wing, as it shot toward the main body of the plane at several miles a second—driving into and through it. The giant plane was twisting, turning, falling swiftly to the dark ground below—then again there came that world-rocking explosion, that mighty column of light, and there was no ship there. The companion ship had shot away from the terrific explosion with a mighty lurch, tumbling, twisting. Then there came a slow, grinding crack, and under that terrific stress the wing broke, and fell suddenly free of the plane! Turning—falling ever faster, the pilot was struggling to turn the nose of the plane up, hoping the engines might hold it from its fall. There was suddenly a mighty gout of light, a great blazing trail of light that reached out behind it—then suddenly the tail of the mighty ship was glowing white hot—flaming. Then again the plane was turning, twisting down, helpless. There was a terrific crash; the mechanical noise of its collision was followed an instant later by the greater crash, as all its energy storage was released.

But to remind the men of the *Solarite* that they were not alone, there came a sudden report just behind them, and they turned to see that one of the energy bombs had just fallen short of them! In an instnat the ship was shooting up at terrific speed, out of danger. It looped, turned, and was hunting, feeling with the disturbance locater for that other ship. The ships were spread out more now. In every direction they could be located—and all were leaving the scene of battle. But one by one the *Solarite* shot after them, and always the speed of the little ship was greater.

Two escaped. They turned off their useless invisibility apparatus and could not be found, for, lost in the night, they were invisible and unlocatable.

Morning found the *Solarite* once more over Kanor,

the Kaxorian capital. Arcot had learned that the language of both these peoples was almost identical. Now he was using his radio, sending his message toward the city. It was long before he got his reply. Perhaps it was that the Kaxorians were almost afraid to reply, for they had seen an awful demonstration of power!

"I am of earth. We want only peace. We will have peace, but we prefer to have it by peaceful means, not by destroying you and your city. There is a mountain to the west of your city. In ten minutes that mountain will suffer the fate that will meet your city if you cannot agree to our terms of peace."

Great rocky cliffs loomed before the tiny ship. They were composed of a green, heavy rock. Suddenly there reached out a thin, wan beam, a ray of light that was scarcely visible in the light of the dawn. But there was a mighty roar, a terrific tornado, and with it a fall of great snowflakes. But there was another fall. The rock suddenly moved with a terrific lunge to the right, half the mountain seemed driving against itself, moving of its own accord, and there was a vast crash of colliding rock. Then suddenly, as if by magic, great cracks appeared in the plain all about it.

The *Solarite* hung high above the city—and ten miles away to the west, just beyond the range of any guns that might accidentally go off. Beyond the city, off to the north, there was a vast cloud of dust settling over a mass of crushed stone. There was a low mound here, spread out wide on the flat plain.

We know the rest. Kaxor was but a victim of bad rulership. The ruler, lusting for greater power, seeing in the discovery of a scientist the necessary means to his ends, had made use of the discovery of the light-power condensation, and his fleet of mighty planes was the result. He had refused to yield to Arcot and the *Solarite*. He was found blasted by a small handlight gun. They never tried too hard to find the assassin, but many people might have been able to give information. Can we blame them? They were perhaps the most advanced people we have ever met. Their scientific discoveries are of immense value to both planets, and to those people on far out Jupiter's moons.

But our metal supplies are no longer a source of worry. Perhaps in a million years—but who knows what man will do in a million years?

THE END

The Drums of Tapajos

By Capt. S. P. Meek, U.S.A.

(*Continued from page 699*)

this country for years, but I always put it down to native legends until I saw that white man. Even then, I thought that he was probably only a rubber prospector who had got lost in the jungle and had gone crazy with the fever. There was something to that yarn after all."

"They are apparently highly civilized, remarked Mariston. "What do you make of the deal, Dunc?"

"I am entirely at sea," I replied. "There is no doubt that Nahum is highly civilized; at least he is a thorough gentleman and a splendid linguist and must know a great deal about sound, mechanics and electricity to be able to perform the engineering feats that we have witnessed. Who or what he is, I can't hazard a guess."

"Well, we'll learn in time," said Nankivell cheerfully. "In the meantime, I am going with Bob to take a bath and see if he told the truth about that razor. Also I'll be glad to get into some other clothes. These are pretty filthy to eat a civilized dinner in."

We explored our quarters and found two rooms, each equipped with two broad divans that looked invitingly soft. Each room connected with a bathroom, containing, among other appurtenances, a deep tub of some sort of stone with huge copper faucets of a peculiar design set in the wall above it. On the wall hung a sizable mirror, and on a shelf below it lay razors, towels, a basin of liquid soap and everything else we could ask for.

"That's what I call service," said Nankivell as he began to disrobe. "I wonder where our new clothes are."

A short search revealed a closet in which hung four robes of the same type as that which Nahum had worn except that they had blue borders instead of crimson and the colored border was embroidered with silver thread instead of gold. The sandals were equipped with blue and silver bands to match the robes.

The luxury of that shave and hot bath surpassed anything that I had experienced for years. I never before realized how much the appurtenances of civilization really meant to my comfort. Our dirty clothing we tossed into the closets and donned our sandals and robes. The outfit was awkward at first, but we soon got used to it and I never wore more comfortable clothing in my life. We returned to our "drawing room," as Nankivell called it, and threw ourselves full length on luxurious divans and waited for Nahum to appear.

END OF PART I.

The Pineal Stimulator

IF, as psychologists say, the subconscious mind registers and forever retains every impression that comes its way, it seems logical enough that in some natural manner these impressions or "memories" should be transmitted to succeeding generations. A discovery of a machine or ray, perhaps, that would act on the pineal gland in such a way as to make it possible for the subject to recall experiences of his ancestors for ages back could probably give us a wealth of valuable data that has never been recorded in the books. A newspaper man and a scientist got together to write this short scientific fiction story and made it one of unusual merit.

IT began as an undergraduate dodge; a typical Jimmy Casmey dodge. Jimmy Casmey, best of friends and roommates, most brilliant of students and—most talented drinker in Theta Delta Chi. Jimmy took a not unreasonable pride in the string of A's that adorned his semester report card, and saw no reason why any human being should be in bed before two o'clock in the morning. It was a matter of utter indifference to him whether the hours preceding his bedtime were spent in studying the latest Smithsonian report or in tipping over tall ones at the Old Vienna Bar and Grill. This was the morning after one of the nights spent in tipping over tall ones.

Biology, Professor Ward, was the first-hour class. It was a recitation day, and Jimmy's evening having been spent as it was the chance of his being caught unprepared with resultant damage to the semester's A was excellent. It became a certainty when Professor Ward started at the beginning of the alphabet instead of with the M's. He worked down through Ahrens, Allen, Bartlett and Bensinghurst. Burkard came next, and after him, Casmey, James. The ax was about to fall.

"Describe the pseudopodia and their function in Amoeba," said Ward, in his most judicial manner, "Mr. . . . er . . . Burkard," and as Burkard climbed fumblingly from his seat, "Dear me, Mr. Burkard, unprepared again? Let's——" But Jimmy, getting on his feet, interrupted. He was carrying the fight into the enemy's country.

"May I ask a question, professor?"

"What is it, Mr. Casmey?"

"Since the paramoecium reproduces by dividing in halves, you said the other day it was practically immortal. Now I would like to know if a paramoecium had a memory, couldn't it remember everything that had happened to it since the beginning of time? . . . that is, since the first paramoecium."

Ward smiled indulgently. "Theoretically, I suppose it would be possible," he admitted. "However, it is pretty obvious that the paramoecium has no memory. Memory implies brain cells, which are specially differentiated tissue, and a paramoecium is all composed of one kind of tissue, the sole concern of which is to exist. Does that answer your question?"

"Well, in a way . . . but . . ." Jimmy was a trifle confused, but was making a brave effort, "what I was leading up to was this, sir. . . . Isn't there a pretty close analogy between the reproduction of the higher animals and that of the paramoecium? . . . That is, the larger animals grow out of a single cell, which divides itself into other cells with specialized functions. Originally that cell is a part of the parent; that is, it has divided from the parent by fission, just like the paramoecium. It seems to me that if it is theoretically possible for the paramoecium to retain memories clear back, it should be theoretically possible for the more complex animals. They are not complete new creations, but parts of their parents. And if it's theoretically possible, why shouldn't it be practically possible?"

Ward rubbed his chin vigorously. "Well, we know that practically it is impossible, don't we?" he retorted, with a smile. "However, I will grant that in point of theory there is something to be said for your view. It is known that the subconscious holds memories of every event the individual has participated in since birth, and as you say, if since birth, why not pre-natal memories also? The difficulty is to get at those memories and bring them to the surface. Now Freud thinks . . ."

He was off, and the day was saved. Jimmy sat down, amid the grateful glances of a delighted class. Anybody who could put one over on Ward like that. . . .

AFTER graduation it was a couple of years before I saw Jimmy again. When I came back for the big game with Bucknell, Jimmy, who had stayed on at the old college as a laboratory assistant in biology, met

By I. M. Stephens *and* Fletcher Pratt

Illustrated by PAUL

¶. . . *I shouted with triumph as I bore her off to my tree house, her dear furry body close against my side. . . .*

me at the station. I was shocked by the change in him. He used to be a natty dresser; now he was distinctly frowzy and his breath smelled of bad gin. I wondered briefly what the college authorities thought of that; decided that they didn't worry as long as he did his work well, and dismissed the subject from my mind. His handclasp, at least, was as warm as ever.

I was a little loath to accept the hospitality of a friend who must be far from flush, but he insisted, and I did not wish to hurt him with a refusal. After the game, accordingly, we foregathered in his room, hoarse with shouting, to discuss old times.

The room was typical of the man. On the mantlepiece a tube of jelly (containing God knew what deadly germs) stood next to an empty gin bottle; the desk was piled with a wilderness of papers, vast and drear, in the wildest disorder. From under the bed a box marked suspiciously "XXX" poked its end, and a row of small lizards, each in its separate alcoholic tomb, formed a decorative frieze around the plate rail some architect had installed. And the floor was a perfect maze of apparatus, chemical and physical, one big brown object that looked like a magic-lantern occupying most of the space.

"Hullo, Jim, what have you got there?" I asked, pointing to the object. "The secret of the death ray?"

"Here," he said, handing me the glass he had been filling. "Take this. No, that's just a piece of monkey business I've been fooling with. 'Fraid I been spending a little too much time and money on it." He took a drink.

"Well, go on," I said, "what's it all about? I'm waiting."

"Well . . ." He smiled sourly. "The truth is that I'm not just sure of myself and Herries thinks I'm stewed or crazy when I try to talk about it. I can't even get him to give it a trial." (Herries was the head of the department.) Now normally, brilliant young laboratory assistants don't care what heads of departments think, nor do they drink too much gin when rebuffed. It must be something quite serious—or too altogether wild for Herries to credit.

"I'm not Herries, you know," I told him. "Tell me about it."

He finished his glass, and then sat for a moment, looking into the bottom of it. "I will tell you," he said finally. "You remember, a long time ago, when Ward called on me one day when I was unprepared, and I asked him a lot of fool questions about subconscious memory? I got to thinking about that and couldn't quit, and the more I thought about it, the more I began to wonder why there wasn't some way to get at subconscious memories.

"The big question was just where they were located. You know there is a lot of junk spread around about the different parts of the brain having different functions, and all that, but nobody has ever proved anything much. I felt that if I could find the part of the brain dealing with subconscious memory, I could find a way to stimulate activity. Of course it wouldn't do to try stimulating the whole brain; that meant stimulating the conscious as well as the subconscious and would bury anything subconscious deeper than ever.

"So I experimented. I boned up on surgery and tried all sorts of tricks, mostly on rats and chickens, cutting out first one part of the brain and then another, and observing how they acted afterward. I got a lot of interesting results, even made a report on it which they printed in the 'Bulletin'—" he motioned indifferently toward the Everest of papers on the desk—"but nothing bearing on what I wanted, till one day when I was working with some lizards.

"One of my lizards was a freak. It exhibited no fear whatever of me or of any larger animal at all; on the other hand, it practically had to be taught to swim; didn't appear to know what water was for. In short, it seemed to be altogether without instincts. If it had been out on its own, it would have been killed in short order.

"I dissected that lizard's brain under a microscope, looking for the peculiarities; if there were any. You know the instinct and the subconscious have been closely connected by so many biologists that it's practically certain they are the same thing. Well, I found only one difference between the brain of that lizard and any other lizard. It had no pineal eye. You know what the pineal eye is?"

I shook my head, "So long since I studied biology——" I began apologetically.

He got up, a trifle heavily. "Here, have another drink. Won't kill you. . . . The pineal eye is right in the middle of the top of the head of most lizards; right in the roof, so to speak. In *Sphenodon*, the New Zealand Tuatera, it's particularly prominent. Has all the earmarks of an eye except that the lizard can't see with it. A shaft of light has no effect on it. Now, it's a peculiar fact that though the pineal eye has been found in many animals, ancient and modern, it's of no use as an eye even to the most archaic. And it seemed to me that it might have some other function; that is, that it might be able to record sensations like an eye, but to record them in a different way; in other words that it might be the repository of instincts, gradually accumulating them from other parts of the brain. The pineal eye is very small, but then, it takes a long time to build up subconscious impressions enough to form an instinct. You see?

"So I started out from there. I began taking the pineal eyes out of my rats and chickens. It involved a lot of delicate vivisection, and more than half the time I killed them, but I did get results. They seemed to be deprived of instincts, just as the lizard had been. . . ." His voice trailed off into silence. "I suppose I would get a lot of credit for that if I made a report and it were checked," he remarked in an altered tone. "But I was waiting for the rest of my experiment and now Herries won't believe me. I believe he's going to turn me out at the end of this semester."

"But what's that got to do with this siege gun?" I put in remorselessly, to recall him to the subject of the discourse.

"Oh, yes. I was telling you about my apparatus. Well, it seemed to me that if I could stimulate that useless pineal eye in some way I should get the subconscious up to the level of the conscious. I tried drugs first. I admit the result was pretty much of a failure. It didn't occur to me till later that there was no use stimulating the pineal eye of a rat or chicken and poking around in its subconscious. Even if I did succeed in awakening old memories how was the animal going to tell me about it? I had to get something that would work on humans. So I tried X-rays. But I had a serious problem there.

"X-rays, you know, vary in their penetrative power. Those that have the greatest penetrative power also have the greatest effect on living tissue, but it is in the main an inhibitory effect. That is, it checks tissue, slows it up. That's why they use radium in cancer—because it emits rays of very high penetrative power which check the growth of the noxious tissue. Now what I wanted was something that would have penetrative power enough to penetrate the skull and the brain and reach the pineal eye (which in man is way inside the brain) and yet have a stimulating instead of a depressing . . . Have another drink?"

I motioned it impatiently away. "Yes?" I said.

"Well, I got it. To make a long story short, I got it. . . . It's a machine that produces rays not very different from Millikan's cosmic radiation; highest penetrative power known. I don't know whether I can explain it to you in terms you'll understand, but I manage to shoot a beam of these cosmic rays into the brain and down the beam carry a stream of stimulating light rays. . . . It works."

"What then?" I asked.

"What then? Why, you oaf, don't you see? Herries thinks I'm crazy or full of booze. I described my results to him, and got him to try it on himself. He had the nerve to insist that I had hypnotized him. I suppose . . ."

I DON'T know whether it was the two drinks I had had or the excitement of the Bucknell game. "Would you like to try it on me?" I asked. "Does it still work?"

He lighted up. "I should say so. Sit right here and

relax, will you? And try to remember what you've been through when you come out of it. I'm not going to hypnotize you or anything, remember. Just stimulate your subconscious a little. Close your eyes." He was connecting up the machine and pointing its gun-like peak toward me.

I sat back in the chair, folding my hands, and closing my eyes obediently. Jimmy's ideas—I remembered the time he had been dragged half-dead from the chemistry laboratory after trying the effect of some chloramine compound on himself and filling the place with noxious gas. Great chap, Jimmy; his funny . . . and suddenly every thought was blotted out in a wave of light that seemed to strike me not through my eyes but through the side of my head.

There was a whirl of kaleidoscopic impressions; I was pushing the swing under the chestnut trees for Viola Schultz (like myself, twelve years old, and possessed of the most elegant blonde curls); I was sliding down a steep bank of snow on a new Christmas sled; faces, father's and mother's, large and distant at the end of tall bodies that towered over a tiny me; more faces, a whirling mist and——

It was cold.

We pushed close around the fire in spite of the smoke of the green wood. The ice that had made every tree a different kind of frosted cake on the day before might be melting, but it was still cold for us after three campaigns in Georgia and Alabama.

"Well, think old slow-trot Thomas will get a-going today?" asked Peleteiah Brooks, drinking his coffee noisily under his big moustache in the steely light of dawn.

"No, he's a-waiting for some of that Iowa popcorn to lie on the fields to show the way for Steedman's sutlers," said somebody else and we all laughed.

"Tell you what——" began Peleteiah, but before he had finished the sentence there was a ring of far-away bugles, growing nearer and nearer down the long line of cantonments as company after company caught it up. We gulped down the last of our coffee, chewed off the remaining bites of hardtack and hurried to fall in as the assembly call came nearer. Captain Harbord, we all knew, was a touchy man.

Off to the right among the hills, a battery had opened fire, white puffs of smoke drifting down from their position, as the racketing sound woke the Johnny Rebs to activity over there. We could see a certain stirring across the valley; and in the intervals of the artillery fire, the pounding of hoofs on the road was clearly audible. A thrill of excitement ran through the company as it formed up. Something was stirring. To left and right other regiments were forming, too.

There was General Cox, on his tall white horse, groomed like a dandy, and surrounded by staff officers. He reined in opposite Company C and spoke briefly. "Men of the Seventy-third Indiana," we heard, and then as the breeze carried his voice away, "blah, blah—these intrenchments—blah, blah, blah." There was a burst of cheers, drowned in the crash of more artillery, over which a bugle sang suddenly, urging us forward. "Forward—March!" cried Captain Harbord, and we stepped out, out of the shelter of the woods, twisting our way through the rifle pits, halting to dress line. The morning was suddenly full of noise, and spurs of red flame shot through the line of the rebel *Chevaux de frise*, followed by little puffs of smoke. A man beside me chuckled, and turning my head to see the cause of his laughter, I noticed he was kicking on the ground, blood pouring from his throat.

It was a long way across the valley; the smoke grew thicker; more men fell, and Captain Harbord, putting his hat on the point of his sword, suddenly began to run forward, crying to us to come on. Then a sudden nightmare of tangled tree-tops pointed toward one; a sight of a Johnny Reb with his rifle aimed right between my eyes, and the ghastly look of the same man as someone in blue struck him from the side; a sudden vision of a deep muddy ditch with dead men in it, and a few grey figures running far, far ahead, across the field, for the shelter of a little wood. A flag! I was cheering, and running after the grey figures.

Somehow, I must have gotten ahead of or separated from the rest. There was a road, a woodland road, down which I ran frantically after a man in grey, who hurried on, hatless, before me. I was gaining on him when he turned in toward a little log house that bobbed up suddenly at one side. He put his hand out for the door, and in that moment of pause I was upon him, swinging furiously with my clubbed musket. It broke down the arm he had flung up as a guard and crushed his skull like an egg. And as I stood in the lust of battle, breathing hard above my dead enemy, the door opened slowly and a woman with the loveliest eyes I have ever seen stood in the aperture looking down at us. "You've killed him," she said, and then her voice breaking, "oh—you beast!" And she knelt by the side of the rebel. But I could only look on in dumb misery, for I knew this was the girl I should always love. . . .

Faces, faces, endless whirls of movement, through which I passed, living æons. A bright word spoken here or a costume there rising to the surface of consciousness. But out of the mist mostly nothing until . . .

WE did not dare go far from the trees because of the creodonts. They had killed Waugh and little Nana not many days before and there was a taboo on leaving the trees. All the rest had forgotten why the taboo had been laid; all but me. But Waugh shared the same tree-house with me and now I was cold at night, so I remembered. That is, I remembered at night, and shivered when I thought of the creodonts.

I had made a song when the creodonts took Waugh. It was a good song; quite the best song I ever made, and everybody in the world had heard it. To make them all hear it I beat two pieces of stone together for a music. They were big useless stones, not at all good for throwing-stones. But as I beat them together and made a music for Waugh, a peculiar thing happened. The spirit of Waugh entered into the stones and one of them broke across and it was a good throwing-stone.

I took that good throwing-stone and with it I killed an eohippus among the trees, which was the greatest luck. So that the spirit of Waugh helped me by a powerful magic because I made a song for him, and a music by beating two stones together. I know it was the spirit of Waugh and a magic because when I tried to beat two stones together again, without making a song for Waugh, they did not crack across evenly and had to be thrown away. The spirit of Waugh was very exacting. I had tried again later, making the song for him again, but I had not used the same stone, and again I got no

throwing-stone. So I threw these pieces away too, and ate nuts.

But I wanted another eohippus, and I knew if I could find the right stone the spirit of Waugh would be satisfied. So I was looking for it and Pel was helping me. That is, he was pretending to help. Really he was hunting along his stomach where the hair is short for fleas, and grunting. He was always grunting and groaning; a most conversational idiot.

"It is very foolish," said Pel, plucking out a flea, "to look for throwing-stones here. Everyone knows they have all been picked up long ago." But I did not tell him about the stone I was looking for. It would have spoiled the magic to tell him. And I did not want to spoil the magic. If I could get another eohippus and throw it on the fire I was going to build under my tree I might get Akh to sit beside me in my tree-house in place of Waugh. Akh was very fond of the smell of roasting eohippus, and I had a plan. When she smelled it and came to sit beside the fire, looking around cautiously, I would drop the magic stone on her head suddenly from above, and drag her up to my tree-house.

At last I found the stone. Pel looked at me scornfully when I picked it up. "Anybody can see that stone is no good for a throwing-stone," he said, "it's too heavy. "Come on, let's look for acorns. The eotitanopses must have left some," and he went off, swinging a stick.

But he came back when I sat down and began to beat the magic stone against another stone, making a song for Waugh. They sat around in a circle, listening and watching. Finally Pel said, "Waugh? I remember someone by the name of Waugh."

They had all forgotten about him, all but me, you see. I did not wish to tell them, because it would spoil the magic, so I said, "He is in the sun. He looks at me." And just then the stone I was beating with the magic stone of Waugh split across. But it was not a good split, whether because of the presence of Pel or because my song was not good, I do not know. So I let the pieces lie and made another kind of song for Waugh, very slow and solemn, beating the stone together carefully. And first one small chip fell off and then another, and the spirit of Waugh aided me and I had the most beautiful of throwing-stones.

The others all looked on in amazement, and said it was a good magic. And Pel said it was due to the spirit of the sun, whose name was Waugh and that we should all bow before the sun. So all the rest bowed before the sun, but I knew. And then Rom, who had found a dead eotitanops the day before and had taken it to his tree-house, picked up the first stone I had cracked with the magic stone of Waugh. It had a long sharp edge down one side. "Look," he said, holding it in his hand, and struck it down the side of the tree. It left a long mark. Then Rom climbed the tree and brought down a coconut and struck it with the chip of stone, and the husk of the coconut fell apart.

"It is better than a throwing-stone," he said, "it is a striking-stone!" And Pel said, "Great is the magic of Waugh." But I went off to hunt an eohippus.

It was two days before I got one at the spring, where a herd of them were drinking. My throwing-stone struck him straight and true in the neck, and he fell with a squeal, while the rest pattered off among the leaves. I shouted with triumph and praised the name of Waugh as I gathered up the little body and bore it back to my tree. From Om I borrowed fire and on the blaze cast the eohippus, not waiting to find a striking-stone to tear it apart. Then I climbed to the tree and sat there with the magic stone of Waugh in my hand.

And even as I had hoped Akh came presently around another tree, looking about to see if anyone were waiting; looking about cautiously and then placing herself by the fire, where she could watch the blaze gathering around the eohippus. And I dropped the magic stone of Waugh on her head, sure and straight, aided by the spirit of Waugh, which was the spirit of the sun. And again I shouted with triumph as I bore her off to my tree-house, her dear furry body close against my side. . . .

THERE was a swift uprush of light like a million Auroras, and I was suddenly awake in my chair, with Jimmy standing over me, and my head aching violently. "Oh . . ." I said.

"An experience, what?" he queried, all smiles now. "Tell me what you saw." I described to him the scenes I had passed through.

"The subconscious exerts a certain selection," he said slowly, when he had taken his place again. "That's why, you know, our dreams never accurately picture things. At least Freud thinks so. That is, the subconscious selects the best bits. I should say that in your case the connected dreams represent the most intense emotional experiences of your particular line of descent. That Waugh part was interesting, but there's no way of checking up on it. But tell me, was one of your ancestors in the Civil War?"

I nodded. "My grandfather. I believe he was in the Seventy-third Indiana, too. He married a Southern girl. I don't know about the battle, or the rest of it, though. But my sister has a lot of his old letters and I'll have a look through them if you'd like."

"By all means do," said Jimmy. "It would give me a lot of encouragement and believe me, I need it. . . . Have a drink. . . . Most of the results can't be checked. That's one of the difficulties with Herries. The last time I tried it I got a scene in the Irish rebellion of 1798, to judge from the costumes and talk. It was quite horrible." He shuddered. "Heads on pikes."

"Why in the world don't you chuck up your job here, old man, and start out on your own?" I offered. "A thing like this would make you for life, if you got before any scientific body with it. Why——"

"Pure prosaic question of cash. And Herries has pretty well discredited me with any scientific body that might be interested. You don't understand the practical difficulties. If I go to the general public I'll just be another charlatan. But I think I have a way of getting around it, if you'll help me. Listen——

"If I change the character of my ray, without altering its wave length, it seems to me that I might be able to alter the character of the stimulation applied to the pineal gland. Now if I altered the character of the stimulation, what would I get? I think I would get a dip into the future. The cells of our body; that is, the central cell, as we may call the pineal, has been eternal up to the present, and therefore holds the memories of the past. But it will also be eternal into the future for so long as we have descendants. And if this central cell has stored up the memories of the past, it must also have within it the reflexes of the future. For reflex actions, the things we do without thought in sudden

emergencies, may be traced to the same source as instincts. Now if the reflexes are stored in the pineal, so must some prediction of the occasions on which they will be used, and I want to go fishing for it."

I shook my head. "I'm afraid I don't follow your line of argument," I told him. "Even the subconscious can't have any memory of a thing which has not yet happened."

A shadow crossed his face. "Yes, I know. You're like the rest of them. You think I'm wool-gathering." His tone was accusatory.

"Oh, for the love of mike, Jimmy, snap out of it. Your idea may be crazy, but I'm willing to go the limit with you in helping you put it over. What do you want me to do?"

He lighted up at once. "Just work this machine for me. Wait a minute. . . . I'm going to take you up on your offer." He dived into the intricacies of a mass of wires and tubes with a pair of long, thin pliers.

"Here's the switch," he said, digging away. "All you have to do is turn it on. I made the thing as foolproof as possible, expecting that I'd have to deal with a lot of chaps like Herries. . . . Don't leave me under longer than thirty minutes. Just turn the switch back when you want to bring me out of it. I gave you fifteen minutes, but this was your first experience, and I didn't want to put too much of a strain on you at first. I can stand thirty, all right."

He seated himself in the chair I had occupied. "The beam of light ought to strike me just behind and above the ear," he instructed me further. If it doesn't, swing it a little here. All right, ready go." And he closed his eyes.

Obediently I snapped the switch. There was a sizzling sound and a shaft of vivid violet radiance issued from the machine to strike Jimmy just as he had predicted on the side of the head, above and behind the ear. I glanced at my watch; when I looked up again, he had sagged a little to one side, his face wearing the peaceful, contented expression of those who sleep dreamlessly.

For a few minutes nothing happened. The machine cracked and gurgled, the shaft of light flowed on. It was really growing frightfully late, thought I, looking at my watch and yawning. Then an inarticulate sound came from Jimmy, and I looked up. He had shifted again a little, and his face was working curiously, almost as though he were in pain. I sprang to shift the machine again to bring the ray to the proper position, and as I did so, Jimmy's features froze into an inhuman expression of horror, and from his lips came a great cry, "The yellow men! Gaz! Gaz!" and he slumped down into the chair, a dead weight, as I shut off the current with fumbling fingers.

The doctor who arrived presently talked of myocarditis, nervous breakdowns and various other learned subjects at great length. Out of all of it I managed to extract the information that Jimmy should be taken to a hospital at once (this had already been done by the time the learned man finished his disquisition) and that his chances for recovery were fair.

But he was slow in recovering. When I went in to see him three days later (the earliest they would let me) he was sitting up in bed—playing with blocks. He received me with a vacant stare and waved one hand eagerly toward a block which was just beyond his reach. . . . The doctor said that he was suffering from acute nervous trouble brought on by alcoholism. And though this verdict does a bitter injustice to my friend, I must needs let it stand until he recovers to clear himself. For I would not dare to have anyone else try the machine, set as he left it to some pitch that reveals horrors so great as to drive my friend out of his mind. And until the memory of those horrors unlocks its grip from Jimmy's brain, no one can tell how to set the pineal stimulator to a point where it will be less dangerous.

. . . But my grandfather did marry a Tennessee girl he met just after the battle of Nashville. And the commander of his brigade was General Cox.

THE END

What Do You Know?

READERS of AMAZING STORIES have frequently commented upon the fact that there is more actual knowledge to be gained through reading its pages than from many a text-book. Moreover, most of the stories are written in a popular vein, making it possible for anyone to grasp important facts.

The questions which we give below are all answered on the pages as listed at the end of the questions. Please see if you can answer the questions without looking for the answer, and see how well you check up on your general knowledge of science.

1. What are distinctive dangers in the river waters of the South American tropics? (See page 690.)
2. What mineral has been used for a long time for drilling and cutting rock? (See page 702.)
3. What is the heat of a substance due to? (See page 706.)
4. Is the center of gravity in the solar system? In the center of the sun? (See page 710.)
5. Why may the planet Venus be without an atmosphere? (See page 710.)
6. What are the general proportions of the elements on earth? (See page 712.)
7. Does titanium require oxygen to burn? (See page 716.)
8. Does the Mississippi River flow up or down hill? (See page 717.)
9. What substance makes the human blood red? What metal does it contain? (See page 719.)
10. What does radium produce in its decomposition? (See page 723.)
11. What is the probable climate of the planet Venus? (See page 725.)
12. On what does the mass of a body depend and what are the measures of energy in the Einstein's theory? (See page 730.)
13. Has light energy and what is its unit? (See page 731.)
14. What is the origin of the decimal system of numbers? (See page 734.)

Missionaries

¶. . . Much more startling . . . was the huge beast-like shape that stood in the center of the screen as though posing for a portrait.

PERHAPS once every fifty or a hundred years, it is given to some brilliant or favored individual to perform some act that will alter the destiny of mankind. Sometimes a statesman, sometimes a general, sometimes a dextrous worker in words, will have the sudden opportunity to shape the future; sometimes it is a scientist that assumes control, and in such a case the change is likely to be startling indeed.

Not more than half a dozen scientists in all history have found themselves in such a world-shaking rôle. One thinks of James Watt; one thinks of Edison; but, at the same time, there are some of whom one emphatically does not think. Among these, I may mention Dr. Ira Rand, possibly the least known of scientific geniuses, yet in some respects the most remarkable of them all.

There are not many persons who know of the discovery made by Rand, and of his phenomenal opportunity. There are not many who are aware of the extraordinary decision which it fell to him to make, and of the rare courage with which he submerged his fame and fortunes. . . .

Had Rand chosen otherwise, his name would rank beside those of Einstein, Marconi and Curie, among the great scientific discoverers of all time. And the earth today would be a vastly different place—but possibly a place less pleasant to inhabit.

Now that Rand has made the unalterable step, it is only fair that the world should learn of his accomplishment—and that it should recognize the self-abnegation of the man. He himself is likely to remain mute; hence I, who served as his right-hand assistant, have taken it upon myself to make his story public.

There are, of course, many who know that Dr. Rand—

from the Sky

By Stanton A. Coblentz

Author of "The Sunken World," "After 12,000 Years," etc.

IT is curious, the one-sided view we generally take about our pet ideas and hobbies! We casually assume that we are superior in every way. And if there are inhabitants on any of the other planets, it hardly seems inconceivable to us that they also might be suffering from the same malady—a certain feeling of superiority. It might be well for us to plan to establish interplanetary communication, which, considering the progress being made now with television and long distance radio connections, might happen sooner than we expect. Surely it would be safer, as our author so clearly points out, to learn what we are up against, while we are still immeasurable distances apart. In his well-known manner, Mr. Coblentz gives us once more an unusual short story of scientific and absorbing interest.

Illustrated by PAUL

as manager of the laboratories of one of our great radio manufacturers—has given much time to experimentation in methods of wireless transmission. His Prismatic Bifocal Television Lens, His Magnetic Tonal Purifier, His Hetero-Dynamic Radio Amplifier, are only a few of the devices by which he has commended himself to attention. Yet, original as these contrivances are, few persons look upon him as more than a clever technician, or suspect the vastly greater achievements of which he is capable.

It was during a period of confusion in the world of radio that the great opportunity came to Dr. Rand. There are none of us who do not recall how, only two or three years ago, owners of radio sets began to complain of unaccountable disturbances, which in some cases became so severe as to preclude normal reception. Not all wave lengths were affected; but there was a certain area, between 220 and 235 meters, which was continuously subject to attack. The noises, which rarely ceased for more than a few minutes at a time, did not resemble static, nor any form of electrical interference; it was as if a heavy, husky voice were calling from the invisible—a voice that spoke no known language!

So loud as to drown out all except the most powerful stations, the tones throbbed and wavered and vibrated with such living accents, that one would have sworn that some actual being was speaking. Yet there was nothing to support the theory that some unlicensed station was interfering. Not only could no trace of any such station be found, but hearers were unanimous in testifying that the sounds represented no known tongue. Moreover—and this was the most astonishing fact—the disturbances were equally prominent in all parts of the earth. Radio owners in South Africa and Siam joined their brothers in America, Europe and Australia in the chorus of complaints; it seemed as if the very atmosphere of our planet had been affected and as if some new and previously unknown influence were convulsing the ether. But scientists, even while hesitantly advancing this hypothesis, could not reconcile it with the fact that the wave-lengths beneath 220 meters and above 235 remained untroubled.

Simultaneous with this manifestation, a strange although minor annoyance had been observed on television screens. Every now and then, inexplicable shadows would flash across the receiving apparatus; dancing points of light would be seen; wavering forms would appear and vanish, or cloudy apparitions present themselves before the eye. Always these images would be small—in many cases no larger than a silver dime; always they would be blurred and flickering, and would speedily disappear; sometimes they would be shapeless as drifting mist, sometimes would seem to form fantastic patterns; but in no case did they show more stability than leaping foam, and in no case could their origin be determined.

There was one fact, in particular, that caused much interested speculation. Like the mysterious sounds on the radio, the images were world-wide in their occurrence; they were as prominent in Peking as in New York, as noticeable in Rio de Janeiro as in Melbourne and London. What hitherto undetected influence was agitating the atmosphere of the earth?

Many were the theories that were advanced and rejected; but, for a long time, no observer traced a connection between the unknown television lights and

shadows and the enigmatical radio disturbances. It remained for Dr. Rand to identify the two as manifestations of the same phenomenon—and thus to open the way for his master achievement.

In the beginning, Dr. Rand himself did not observe the connection. He was interested chiefly in the aberrations of the television screen—and, from the first, he harbored a theory which bears testimony to the intuitive powers of genius. The nature of that theory long remained a mystery even to me, who spent my days in close contact with Rand; but I was not slow in noting the eagerness that had come into his eyes, the excited haste with which his lean, nervous figure went bustling about the laboratory, the enthusiastic ring in his voice and the absentmindedness that was overcoming him—most of all, the air of world-excluding preoccupation, with which he would bury himself for hours on end amid a mass of wires, lenses, batteries, electro-magnets, and foul-smelling chemicals.

That he was working at some new invention was evident—but how guess the purpose of that invention when he persistently refused to answer my questions, or else testily advised me to "mind my own business?" At times, to be sure, I did secure peeps at the apparatus which he was slowly putting together; but the complicated array of wires, mirrors and vacuum tubes told me nothing beyond what I already suspected. With a sigh, I was forced to dismiss the matter, and to decide that Dr. Rand would let me into the secret only when his whim should dictate.

IT was long before his whim did dictate. Days went by, weeks went by, months went by, and in my absorption in other matters I had almost come to forget Dr. Rand's experiment. When now and then the thought of it recurred to me, I would dismiss my doubts with a shrug, concluding that probably the invention had failed. And since I had been called temporarily to another part of the laboratory, where I could not watch Dr. Rand at work, I had no longer any visible reminder of what he was attempting. Hence the eventual announcement found me unprepared.

I still had no inkling of the truth when, greeting me one morning with a dancing light in his eyes, he jovially invited me to his private laboratory. "I have something to show you, Denison," he said, in suppressed tones beneath which I seemed to read a veiled eagerness. "Something I want your opinion about."

As we started away together, he stroked his bristly brown beard thoughtfully, and in his eyes the dancing light gave place to one of shrewd anticipation.

Yet I observed nothing to justify that anticipation when we had reached our destination. Before us, attached to a television receiver, stood a weird-looking device reminding me of an enlarged X-ray machine. I could see that, within a long central tube, there was a series of queerly arranged crystals and lenses; I could see various prisms and mirrors, and I could observe that wires, attached to a wall socket, were running through the whole. But all this gave me little hint as to the nature of the contrivance.

"You behold here a Micro-Crystalline Televisor," explained Rand, surveying his invention proudly. "The first of its kind ever created."

"Micro-Crystalline what?" I gasped.

"Micro-Crystalline Televisor. It is designed to enlarge and clarify images beyond the range of the ordinary television receiver."

"You mean—it is a receiver of exceptional power?"

"It is that—and more than that. You see that there are two screens." Here he pointed to two wide strips of white cloth, placed at opposite sides of the room. "The first receives an image in the manner of an ordinary television apparatus. The second takes the image reflected from the first, after it has been magnified and refined by the lenses, much as the leg of a flea or the wing of a gnat will be magnified by a microscope."

"What is the principle behind it?"

Rand smiled, and stroked his beard as if in self-congratulation. "Nothing except a fresh application of laws already well known. Simply the laws of the enlargement and clarification of images by means of lenses, and their transmission to a screen. You see it in operation daily in the motion picture machine. To be sure, in that case the enlargement is made from a film; but I have secured the practical equivalent of a film by means of careful refraction from mirrors and well placed crystals. An image, obtained from the first screen, is transmitted to the second, purged of imperfections and magnified between ninety and a hundred and fifty diameters. Do you wish a demonstration?"

I nodded.

"The peculiar dancing lights and shadows on the television screen were what gave me the idea," continued Rand, as he carefully focused the machine and pressed an invisible button. "It was an inspiration—I am elated to see my theory confirmed."

No sooner had he spoken than he snapped off the electric lights and the room was plunged into darkness. There came a queer whirring sound which told me that the machine was in operation; there came a sizzling series of blue sparks—but that was all. The screen remained blank; and, as I watched in bewilderment, it seemed to me that Rand's experiment had failed.

"You must give it time," boomed the husky voice of the inventor, as though he had read my thoughts. "I am not trying for any ordinary television reception. I want to show you the mysterious lights and shadows. If you will wait a moment, they are certain to appear."

Fortunately, my patience was placed under no strain. Even as the words left Rand's lips, a minute, slowly moving image leapt up on one of the screens, blurred and irregular in outline, and of a mottled gray hue. Being of a kind which I had frequently seen, it caused me no surprise; but what did surprise me—indeed, what startled me so that I gaped like a man gone mad—was the reflection that instantly appeared on the second and larger screen.

Even to this day, when all that happened then is an old and often repeated story, I find it impossible to describe my consternation, my blank and uncomprehending amazement. Certainly, this was the weirdest sight I had ever seen! Or was it the weirdest?—— Not less unearthly spectacles were to follow, but none that left me so dazzled, so stupefied, so altogether nonplussed.

Across the ten-foot reaches of the screen, there flickered what I might have taken for a motion picture projected by some fabulous and superhuman operator. It seemed to me that I was gazing upon a forest, rank with a wild and monstrous vegetation; it seemed that snake-like slimy tendrils were threshing and swaying along the ground like gigantic arms seen in delirium; it

seemed that, roofing in these animate and convulsive masses of creepers, were huge mushroom-like plants, whose columns were thick as a man's body, and whose gracefully curving domes stood edge to edge, as though placed in harmony by some master artist.

BUT these were not what held my attention. Much more startling, much more incredible, was the huge beast-like shape that burst through the thicket, and stood in the center of the screen as though posing for its portrait. Was it really beast? Or was it man? Surely, it seemed as much like the one as like the other! Of gigantic stature—it must have been more than eight feet in height—it came bounding to view in the manner of a kangaroo, leaping with ease and agility upon its enormously developed hind legs. Its fore limbs—three in number—ended in crab-like tentacles which gave it a most repulsive appearance; its coat was of some dark hairless substance reminding me of a close-fitting uniform; its chest was extremely broad and capacious, its abdominal parts narrow and contracted; while what struck me most of all was its huge and unusual head.

This alone it was that gave the creature its human appearance. Preternaturally large in proportion to the size of the body, it was a sagacious oblong in shape, and seemed more than half forehead. The eyes were mere glittering points beneath the hairless brow; the face was flat, and a small round opening showed where the nose should have been; the mouth was almost invisible, and there was not even the suggestion of a chin. Yet, despite its atrociously ugly appearance, the face was ruffled with deep lines and furrows that gave the unmistakable impression of intelligence.

For a moment I stared at this outlandish thing with the feeling of one who has seen a ghost. Though never subject to hallucinations, I was willing to believe that this was some delirious vision that would swiftly vanish. But the seconds went by, and it did not fade. The fantastic man—or fantastic beast—continued to gaze at me from the screen as if to inquire, "Well, friend, what do you think of me?" And I continued to return his glance with a sort of stupid speechlessness.

It was the murmured words of Rand that restored my senses. "What do you say, Denison? What do you say now? How do you like my televisor? Is it a success, do you think?"

"Success?" I blurted out, still unable to collect my thought. "I—I don't quite understand. What—what can it mean? Have we both gone mad, Dr. Rand?"

Heartily the laughter of the inventor rang through the room. "Mad?" he echoed, as if relishing some secret joke. "Mad? No, I don't believe so—though you're likely to see enough to unbalance any man. You think this image extraordinary, do you?"

Again he laughed, though still for some reason that I could not understand.

"Extraordinary is not the word! It is unbelievable!"

"Nothing is unbelievable," he dogmatized, "when you are looking at another planet."

"Another planet?"

"You certainly don't recognize anything on this planet, do you?" he went on, suavely. "You are viewing a typical scene on Mars."

Breathlessly I gaped at him. My heart seemed to stop short; the word Mars came to my lips, trembled there, and died unuttered.

Not waiting for me to recover from my amazement, Rand fluently continued, "The images on the screen only bear out what I suspected long ago. The disturbances in television could not be explained by any earthly influence; therefore I concluded that their source was extra-terrestrial. It was in the hope of messages from outer space that I experimented with my televisor. For a long time, evidently, Mars has been trying to communicate with us. I have been the first to catch the messages."

"How do you know it is Mars?" I demanded.

Rand smiled as one might smile at a child who has asked some preposterous question. "Because the surface conditions, as I observe them, correspond with those on Mars and on no other known planet. You notice, for example, how large the men are, and how easily they move about. That is because, the planet being smaller, there is less gravitational pull to restrain them——"

"You might also say that of Mercury— and of the moon," I objected.

"So you might—but there is other evidence. Suppose, however, we do not argue. After you have had a few more peeps, we may be better able to talk."

A few moments passed in silence. The image of the huge, big-headed creature fled from the screen; and in its place other images appeared. So startled was I that many of them quite eluded me, and I cannot begin to enumerate them all. I do recall, however, that I had glimpses of sandy plains covered with a scraggly, fungus-like vegetation; of wide, straight waterways bordered with gelatinous weeds; of cloudless heavens in which shone a sun smaller than ours in appearance, and two minute moons; of fields of spiny grasses in which six-legged mice-sized creatures leapt with the agility of of grasshoppers; of strange octagonal towers, open at the top, through which sprang queer man-like beings such as I had already seen; and of little flying cars, scarcely bigger than wheelbarrows, by means of which these beings projected themselves high in air, now floating gracefully with the motion of a breeze-blown leaf, now restlessly circling and spiralling like a gyrating fly, now shooting straight upward and descending with a rocket-like precision and speed.

I had no longer any doubts. "Dr. Rand," said I, taking both his hands warmly, while my eyes, I fear, grew dim with emotion, "Let me congratulate you! You have made a miraculous discovery! You have accomplished a scientific——"

Dr. Rand smiled gravely. "Thank you, Denison," he interrupted. "But let us not be premature. Wait till you have seen all. I am working at a still more remarkable discovery. When that is completed—then, if you wish, you may be enthusiastic."

Press him as I might, he would not explain what he had in mind. He merely nodded cryptically, and bade me be patient; then abruptly turned aside, and signified that the interview was at an end. But the time was not far off when I was to learn that he had been making no idle boast.

ONLY a few weeks later, he again called me excitedly into the laboratory. Once more I found myself face to face with the "televisor"; once more I saw the blue sparks flashing, and viewed fantastic images on the screen. But, on this occasion, there were some new instruments present—a microphone and a powerful radio receiver, of the type designed for long-

distance reception. "Now I want you not only to watch carefully, but to listen," prompted Rand, his gray eyes a-glitter with an eager light. "See if you do not notice something unusual."

So speaking, he switched off the current, and the images on the screen vanished. Then carefully he adjusted the radio dial and set the machine into operation; and, at the same time, he renewed his activities with the "televisor." I was interested to hear once more those strange noises that had puzzled listeners for months; I was interested to note that the "televisor," operating intermittently, exhibited pictures of bare snow-plains, of hills covered with weird castle-like houses, and of strange octopus-like animals that sidled across the land like living nightmares. But at first I did not observe the vital fact.

"Well, you see?" inquired Rand, expectantly, after I had followed the exhibition for a moment.

"I see many queer sights——" I started to confess. But the wry expression on his face cut me short; I knew that I had been guilty of a stupid reply.

Hence I continued to watch and listen—soon a striking discovery flashed upon me. The peculiar noises on the radio occurred simultaneously with the images on the screen! When the one ceased, the other ceased; when the one was resumed, the other was resumed! Not once, but a dozen times, this occurred; the appearance and cessation of the two synchronized absolutely! Mere chance could not be the explanation; no series of coincidences could work out so perfectly; the relationship between the radio and the television pictures was demonstrated beyond question!

But what did that relationship imply? So I inquired of Rand, as I turned to him with bewildered exclamations. "Did the radio noises also issue from Mars?"

"Yes, the noises do issue from Mars," he declared, in matter-of-fact tones, but with a twinkle of undisguised enthusiasm. "They too represent part of the attempt to communicate with us. Both by sight and by sound, the Martians wish to impress us."

"But how—how did you find it out?" I demanded.

"Merely by accident. One day I happened to have the televisor and the radio in operation at once—and I would have had to be blind and deaf not to notice the connection. What astonishes me is that no one has discovered it before."

"Perhaps others have discovered it," I suggested. "After all, what good would it do them?"

"What good would it do?" He flung back my words with an angry vehemence; for a second he stood regarding me in surprise and indignation. "What good would it do, my dear man? Do you mean to tell me you don't see? Why, it is the Rosetta Stone of science! It is the key to the most baffling of enigmas! It holds the secret of world-to-world communication!"

Blankly I stood regarding the inventor. "To enter into world-to-world communication, Dr. Rand," I protested, mildly, "one must not only receive messages, but send them——"

"And who says I can't send them?" he flung back, not waiting for me to finish. "For heaven's sake, Denison, what do you think I've been working at all these weeks? After all, the problem is not so difficult. Knowing that the Martians have a powerful transmitting apparatus, it is reasonable to conclude that they have equally powerful receivers. Given sufficient electrical energy, it has long been possible to send messages anywhere on earth; given sufficient increase of power, there is no barrier to flashing our words through the ether even across a distance of many light-years, since the ether, being a conductor of heat and light, would also convey the Hertzian waves——"

"You mean, then, you have succeeded in connecting with Mars?" I cut him short.

"Exactly. Remember this: at its closest approach to the earth, that planet is but thirty-five or forty million miles away, and even at its farthest is separated from us by little more than two hundred million miles—a mere stone's throw, as astronomical distances go. Now, considering the sensitiveness of the Martian instruments, a power of one thousand kilowatts, which I have applied to the radio and television transmitters——"

"Is sufficient to enable you to say 'How-do-you-do?' to the Martians?" I finished for him.

"More than sufficient. I have already exchanged a few elementary ideas with them—and have found the results quite edifying."

"Doubtless," I commented, not quite certain whether Rand were serious or were but trying to test my credulity. "Of course, you understand the Martian language by intuition——"

"No, but I am taking a course of instruction."

This statement Rand made in the simple and unpretentious manner of one who announces that he is studying French or Spanish.

"By this time, I am an advanced student," he continued, while I smiled skeptically. "When the Martians intercepted the first television images I sent them, and so found that I had caught their messages, they were eager to give me lessons. It is not really difficult. Want to see how it is done?"

"Seeing is believing," said I.

Immediately Rand turned to the microphone, and bellowed out a long and unintelligible drivel. While I was wondering if excessive experimentation were not driving him mad, he took out his watch, carefully noted the time, and remarked, "It will be a little more than eleven minutes before we can get our reply, for Mars at present is more than sixty million miles away, and the ether waves, making the round trip at the rate of one hundred and eighty-six thousand miles a second——"

"Yes, I understand," I interposed. "No doubt I can wait the eleven minutes."

None the less, I had never thought that time could pass so slowly. Conversation lagged; Rand and I alike did nothing but consult our watches; and the watches, as if ruled by some tantalizing demon, persisted in crawling at a worm-like pace. What was I to see when the time had expired? Frankly, I expected nothing at all; yet, as the minutes dragged past, I could not check an eagerness which was gradually taking possession of me.

AT last the specified period had elapsed. "Time!" announced Rand, snapping the watch back into his pocket. And, as promptly as though regulated by clockwork, the demonstration commenced.

It was really nothing very spectacular, yet it was as extraordinary a thing as could be imagined. On the screen before me there appeared one of the big-headed, five-limbed creatures that I knew to be a Martian man; and behind him was the same moving, snake-like foliage

that I had already seen. Simultaneously, slow and distinct sounds, like human speech, began to issue from the radio; and I saw that those sounds harmonized with the motions of the man, and that he was acting as would an instructor addressing a class. First he would bend down and tap his knee, while over the radio the word "Molab!" would come to us clearly; then he would touch his thigh, and we would hear, "Darg! Darg!"; then he would indicate his breast, and "Habot! Habot!" would burst upon our ears; then he would refer to various other parts of his anatomy and to the features of his surroundings, proceeding always with a care and deliberation that made his intentions obvious.

"Better take down the words, Denison," advised Dr. Rand. "This is all for your especial benefit. I notified him that a newcomer would be here. Personally, of course, I am already far beyond this stage. I have a vocabulary of more than two thousand Martian words—which, moreover, I can combine into sentences. Besides, I am teaching the Martians English."

While this announcement left me stricken speechless, and while the demonstration on the screen still continued, Rand delved into a drawer, and drew forth a note-book lettered with crazy-looking hieroglyphics. "I have the Martian words noted down here," he informed me. "Also, I have a record of everything the Martians have said to me, and of all that I have said to them. Already I have gathered information enough to take the world by storm."

"God in heaven! Why not do so?" I exclaimed.

"I shall. I surely shall—in time. But I do not want to be premature. When I have my story complete, the effect will be much more shattering. Meanwhile, would you like me to read you some of the results?"

To this question, of course, there could be but one answer. After Rand had switched off the "televisor" and the radio, I sat down to listen to his reports.

"The Martians appear to be a curious people," he assured me, by way of preliminary. "They do not seem to look at things as we do. Of course, there are gaps in my knowledge of their speech, which I have had to fill in by guesswork. But here is what they seem to think of us."

And slowly he read, "Our earthly brothers, inhabitants of a younger and weaker world, it is with great joy that we greet you across space. For thousands of years we have known that your planet was populated, but we have long debated whether it was populated by intelligent beings. The accepted opinion was in the negative; none the less, from time to time throughout the ages we have attempted to send you messages. But they were never acknowledged until now, leading us to conclude that you knew nothing even of so primitive a device as wireless. To the argument that this proved you mere crawling beasts there was apparently no answer. Of course, it was argued that you were but an infant race, having at most a few hundred thousand or a few million years behind you; our ancestors were turning out works of wisdom, when yours were fishes squirming in the salt waves. Even so, we were disappointed at your lack of progress. But now that we have learned that you are on the threshold of civilization, we are delighted to exchange ideas with you, and to offer that aid to be expected of elder brothers."

Rand paused, and looked at me with a quizzical smile. "Rather interesting, don't you think?" he inquired.

"Rather presumptuous, I should say. The Martians seem to look down on us from an almighty distance. But how did you succeed in getting so complete a message?"

The inventor regarded me thoughtfully, and slowly replied, "Interspersed with the Martian, there were some English words, which our friends up there were remarkably quick about picking up. For the rest, facial expressions, gestures, charts and pictures aided me to understand. Of course, it has taken months of preparation. . . . Do you want to hear more?"

I grunted in the affirmative.

Rand turned the pages of the note-book with a doubtful expression. "Now here is something curious," he stated at length. "A while back, I sent them a television image of myself, but did not mention who or what it was. Their response is refreshing. Just observe what they think of me."

"Our earthly brothers, we were amazed at the picture of the strange two-legged animal. How unspeakably ugly! Is it a domestic beast? It looks harmless but stupid. What is the peculiar pointed swelling in the middle of the face just below the eyes? And what the mat of hair at the bottom of the face? Even our domestic animals have had no hair for thirty million years. A committee of scientists, called in to observe the exhibit, believe that it represents some primeval form which should have been wiped out ages ago——"

Rand ended in mid-sentence; my laughter cut him short. "Perhaps the remarks are justified!" he declared, joining me in hearty merriment. "Well, these are the least ludicrous reports I could read you. You had better wait a while before hearing any more. I am about to send the Martians an account of our ways of living, accompanied, when possible, by television pictures."

My curiosity being whetted, I attempted to coax further information from Rand. I urged him to read me more of the Martian communications; I pleaded with him to give the results of his inquiries immediately to the world; I entreated him to take me deeper into his confidence, so that we might conduct immediate inquiries in partnership. But to all my appeals he turned a deaf ear. Never had I met a man more doggedly bent on following his own way! Not only did he pledge me to secrecy, but he was determined to reveal nothing more to me for the present, and to keep his results from the world until his findings were complete. And I, while feeling unbounded admiration for the genius of the man, was disturbed in unaccountable ways by his secretiveness, as though I had some indefinable intimation of evil to come. . . .

FROM time to time, during the weeks that followed, I attempted to wrest from Rand some word as to the progress of his experiments. But though I encountered him daily, there was little information I could obtain. He would answer my inquiries by asserting that everything was "going splendidly" or that he had just "received a new message," but he would not enter into details; and all the while he was obviously preoccupied, and was changing in ways that alarmed his other associates no less than myself. Habitually he was coming to wear a far-away, abstracted expression, as of one who dwells in some other universe; he was growing absent-minded, and would be as likely as not to forget whether or not he had adjusted his cravat or eaten his breakfast;

he would pass us sometimes without a nod, not because he wished to be rude, but because he actually failed to see us; he was becoming emaciated and thin, and his eyes were aglow with a frenzied, almost fanatical fire, while now and then he was heard muttering to himself, as if in secret ecstasy or dread.

It was three months before he again called me into his laboratory, and signified that he had a revelation to make. His face on this occasion looked strained and worn, as in the case of one who has endured some intolerable worry; his cheeks were almost cadaverous in their pallor, but in his eyes there was the brilliant flame that had been there so often of late. "Well, Denison," he exclaimed, as he sank wearily into a chair beside the "televisor," "I don't know how much longer I can keep going. My researches have been eating away at me like a disease. It is time that I take someone into my confidence. The burden is too much for me to bear alone."

"What burden?" I demanded.

He looked at me wistfully, and shook his head slowly, as if but half decided on his course. "I do not know, Denison," he ruminated, "if it is fair to make you share the responsibility. The weight of the whole world rests upon my head. I have it in my power, if I will, to change the course of history."

Wonderingly I stared at him. Was not the explanation that the man had gone mad?

"Queer things have happened since I spoke to you before," he stated. "I have received startling messages. A momentous decision lies in my hands. A final message, which I expect this afternoon, may determine my choice."

"You speak in enigmas," said I.

"Events make me speak in enigmas. But the greatest enigma is that which lies unsolved before me. Oh, God, that I may have the wisdom to decide rightly!"

Abruptly he arose, and, clenching his fists, went pacing about the room in the manner of one distracted.

But after a moment, he resumed his seat. Becoming more settled he confided, "The messages I have received of late, Denison, place me in a fearful dilemma. You must not mind my actions; they are merely my efforts to retain a grip on my sanity. Sometimes I wonder whether I have not been dreaming. . . . Let me read you some recent messages."

He fumbled for his note-book, which displayed scores upon scores of pages packed with hieroglyphics. Momentarily he hesitated; then mumbled, "Here is something typical," and began to read:

"Our earthly brothers, we cannot decide whether what you tell us is serious or in jest. But it must be in jest. You say that your world is divided into many nations—have you not learned to uproot narrowness? You say that, within those nations, some persons have wealth to squander while others starve—can it be that justice is unknown in your land? Worst of all, you declare that the nations permit wars in which hundreds of thousands or even millions of citizens are slaughtered—is it then that your planet is a madhouse? No, our earthly brothers, we will not believe so. You must be jesting. On our world, no nations have existed since our emergence from barbarism tens of millions of years ago. In all that time no Martian, except an occasional victim of mental disease, has lifted his arm against another Martian. It must be so with you too, our earthly brothers, for are you not also civilized?"

Rand paused, and looked up with a grim smile. "That is only one message out of many," he declared.

"Well, what of it?" said I. "The Martian views may be a little peculiar, but that is no reason to let your hair turn gray."

"Not in the least. But you do not understand," he continued, while his thin fingers nervously toyed with his untrimmed beard. "We have created a consternation on Mars. When the people there found that I was not jesting, but that we really do have nations and warfare, they expressed their pity and dismay. They concluded that we were savages in need of intelligent guidance, and started a movement to remake the earth. They have the spirit of the true reformer, I believe, for they want to model our world on the plan of theirs."

"Well why not let them try?" I suggested with the attempt at a laugh. "At their distance, they are not likely to prove dangerous!"

"Yes, but they can overcome the distance!"

SUDDENLY Rand's manner became alert, decisive, fiery, and it was with a startling energy that he proceeded. "They can overcome the distance! They are a million years in advance of us scientifically! They can cross the void to the earth! They have actually flown through space to certain of the asteroids, millions of miles away! If we will let them, they will come to the earth! It is all for me to decide, for me to decide!"

Filled with the vehemence of this announcement, Rand again shot to his feet. His whole frame was quivering; his movements were abrupt and violent as he once more began to pace the floor.

"Calm yourself, Dr. Rand," I urged, springing to his side and taking his arm. "Calm yourself. Tell me, just what is for you to decide?"

"For me to decide whether the Martians will come here!" he burst forth, flinging himself free of my arm. "For me to decide whether they will come as missionaries! Whether they will give us their ways of thought, of living, their civilization. The Martians want to convert the earth! It is all, all for me to decide!"

Disregarding my entreaties, he continued to storm back and forth like a man out of his wits.

At first, of course, I did not take him seriously. In spite of the earnest, glittering fire in his eyes, the obvious explanation was that the poor man had taken leave of his senses. Hence I did my best to humor him, to console him, and to pretend to give credence to his erratic notions.

"The fact is," he went on to explain, when finally he had been somewhat sobered, "that the Martians would completely transform life here. Being in command of unlimited mechanical power, they would control us as we control the cattle of the fields. They would take up the reins of government in all lands; they would make the laws; they would batter down social distinctions; they would re-distribute wealth, level away inequalities, prohibit warfare, and abolish national differences."

"In other words," said I, still not taking Rand seriously, "they would convert our world into a Utopia!"

"Yes, but into a Utopia without freedom. We would no longer fight, cheat, bicker, and destroy—but we could no longer go our own way! We would have to act as the Martians saw fit! Would we be better off? Would we be better off? I keep asking myself. Would the gain equal the loss?"

"My dear Dr. Rand," I protested, observing how the inventor, frenziedly raking his hair, was still pacing the floor, "I feel sure that you exaggerate. How can the Martians do all these things? Certainly, you are making a mountain out of an anthill!"

Rand turned to me with contempt staring plainly from his eyes. "It is evident that you do not understand," he exclaimed. "Well, then, perhaps you will see for yourself! The time has come for more television messages! Your own eyes will inform you!"

Hastily he turned to the "televisor," and after a moment the sputtering blue sparks began to appear, and images flashed once more upon the screen. Multitudes of the huge, five-limbed Martians darted before us, their noseless faces hideous as goblins. Some were clothing themselves in queer balloon-like suits ten times their own size; others were wielding long syringe-like tubes from which foggy vapors issued in spurts; still others were flying through the air in their odd little cars, or else springing along the ground in frog-like leaps. Truly, they made an impressive, a frightening assemblage; they struck me as things horrible, inimical; I was alarmed, though I knew that they were sixty million miles away; I shuddered as at the vision of a ravaging army.

"See them getting ready to invade the earth!" exclaimed Rand, in wild eagerness. "Those balloon-like devices are vacuum garments with which they may counteract the Martian gravitation and reach the earth. Look how they are all ready to set out! Notice those syringe-like machines! They will discharge gases to paralyze our will-power and make us unable to resist! The expedition is all ready! The missionaries will come, will come—if only I give the word!"

"Why must you give the word?" I gasped. But just at that moment the radio, bursting into action, uttered a deep-pitched series of Martian phrases. And Rand turned to his note-book, and began to scribble with frantic haste.

Even as he took down the words, he translated them in excited tones for my benefit.

"Our earthly brothers, the expedition is ready! We will go to you in your need, and elevate you to Martian standards! We will wipe out all earth-made laws, and replace them by Martian codes; we will rule you for your own good. At last, our earthly brothers, you will rise above the barbarism that has engulfed you!

"But before we can come to your aid, we need some assistance from you. We must know the exact chemical composition and density of your atmosphere, so that we may adjust ourselves to it; we must be directed to some flat and open stretch of land, so that we may not fall into the sea or be lost among the high mountains. Tell us these things, O, our earthly friends, and twenty thousand missionaries shall set out this very day!"

THE message stopped short. Rand, flinging down his pencil, sat mopping his hair in the manner of one gone mad. "Shall I tell them?" he kept repeating. "Shall I tell them? The temptation is so strong! They will come here, and will create a different world! There will be no more wars! No more social inequality! All will have plenty, all will tolerate their neighbors! But we will no longer be free, then! Oh, shall I tell them?"

"Calm yourself, Dr. Rand!" I cried for the twentieth time, coming over to him and taking his arm. "Calm yourself! There is no reason for such agitation——"

Suddenly he seemed to get beyond control. "There is reason!" he shouted, leaping to his feet. "There is more than reason! I—I cannot take the chance! Let me—let me put the temptation away! Let me put it beyond me!"

As he uttered these words, he seized his note-book, and violently ripped it from cover to cover; then, with maniacal fury, tore it into scraps, and set a match to the ruins.

"Dr. Rand! Dr. Rand!" I yelled, darting forward and striving to deter him. "Dr. Rand, what are you doing? All your notes! All the messages from Mars! All——"

He did not seem to hear me. Like one filled with a lust of destruction, he was bent upon a still more disastrous work. Seizing a heavy steel rod from the laboratory table, he rushed like a madman toward the "televisor," and began to deal blow after heavy blow upon the delicate apparatus. Crash followed crash in bewildering succession; shattered glass and twisted steel fell in a rain of ruins to the floor; while I, standing helplessly by, cried out in horror and dismay, "Dr. Rand! Dr. Rand! Your invention! Your great invention! You are wrecking your invention! Stop, stop, Dr. Rand! Stop! Stop!"

But he would not stop. Still, with insensate frenzy, he beat and beat at the ruins, until soon nothing remained but a mass of splintered lenses and battered tubes and wires.

Then, all at once, every atom of energy seemed to leave his body. He sank wearily into a seat; the distracted look on his face gave way to one of utter listlessness; he sighed, and his voice was blank with despair as he moaned. "It is done, done, done! I had to do it! My invention—ruined, ruined! It will never be given to the world! I had to do it! The Martians would have come and ruled us! Who was *I* to let the world be overturned? Better to destroy my invention! We will never speak again with the Martians! Never! Never!"

For a long while Rand sat moping by himself, uttering hardly a word, scarcely seeming to hear my distressed inquiries. But when at length he did arise, it was with a new calmness in his eyes, despite the pallor of his cheeks. His lips were firmly compressed; he bore the look of one who has safely mastered a storm; I could see that my fears for his sanity had been needless.

"Denison," he said, putting his hand gently on my shoulder, "let us forget what has happened. It had to be—I feel that we have avoided a great danger. . . . What do you say to dining at the club tonight?"

As I accepted the invitation, and as, with shaking fingers, I took the cigarette he offered me, I had the feeling that he had performed a greater deed in destroying his invention than in creating it. Yet that mass of torn metal and broken glass, lying twisted and ghastly upon the floor, seemed to stare at me like a silent reproach, and I groaned inwardly to think that Rand's prodigious achievement should have perished before the world had had a chance to marvel and applaud.

THE END.

The Cosmic Express

By Jack Williamson

Author of "The Green Girl," "The Metal Man," etc.

MR. ERIC STOKES-HARDING tumbled out of the rumpled bed-clothing, a striking slender figure in purple-striped pajamas. He smiled fondly across to the other of the twin beds, where Nada, his pretty bride, lay quiet beneath light silk covers. With a groan, he stood up and began a series of fantastic bending exercises. But after a few half-hearted movements, he gave it up, and walked through an open door into a small bright room, its walls covered with book-cases and also with scientific appliances that would have been strange to the man of four or five centuries before, when the Age of Aviation was but beginning.

Yawning, Mr. Eric Stokes-Harding stood before the great open window, staring out. Below him was a wide, park-like space, green with emerald lawns, and bright with flowering plants. Two hundred yards across it rose an immense pyramidal building—an artistic structure, gleaming with white marble and bright metal, striped with the verdure of terraced roof-gardens, its slender peak rising to help support the gray, steel-ribbed glass roof above. Beyond, the park stretched away in illimitable vistas, broken with the graceful columned buildings that held up the great glass roof.

Above the glass, over this New York of 2432 A. D., a freezing blizzard was sweeping. But small concern was that to the lightly clad man at the window, who was inhaling deeply the fragrant air from the plants below—air kept, winter and summer, exactly at 20° C.

With another yawn, Mr. Eric Stokes-Harding turned back to the room, which was bright with the rich golden light that poured in from the suspended globes of the cold ato-light that illuminated the snow-covered city. With a distasteful grimace, he seated himself before a broad, paper-littered desk, sat a few minutes leaning back, with his hands clasped behind his head. At last he straightened reluctantly, slid a small typewriter out of its drawer, and began pecking at it impatiently.

For Mr. Eric Stokes-Harding was an author. There was a whole shelf of his books on the wall, in bright jackets, red and blue and green, that brought a thrill of pleasure to the young novelist's heart when he looked up from his clattering machine.

He wrote "thrilling action romances," as his enthusiastic publishers and television directors said, "of ages past, when men were men. Red-blooded heroes responding vigorously to the stirring passions of primordial life!"

He was impartial as to the source of his thrills—provided they were distant enough from modern civilization. His hero was likely to be an ape-man roaring through the jungle, with a bloody rock in one hand and a beautiful girl in the other. Or a cowboy, "hard-riding, hard-shooting," the vanishing hero of the ancient ranches Or a man marooned with a lovely woman on a desert South Sea island. His heroes were invariably strong, fearless, resourceful fellows, who could handle a club on equal terms with a cave-man, or call science to aid them in defending a beautiful mate from the terrors of a desolate wilderness.

And a hundred million read Eric's novels, and watched the dramatization of them on the television screens. They thrilled at the simple, romantic lives his heroes led, paid him handsome royalties, and subconsciously shared his opinion that civilization had taken all the best from the life of man.

Eric had settled down to the artistic satisfaction of describing the sensuous delight of his hero in the roasted marrow-bones of a dead mammoth, when the pretty woman in the other room stirred, and presently came tripping into the study, gay and vivacious, and—as her husband of a few months most justly thought—altogether beautiful in a bright silk dressing gown.

Recklessly, he slammed the machine back into its place, and resolved to forget that his next "red-blooded action thriller" was due in the publisher's office at the end of the month. He sprang up to kiss his wife, held her embraced for a long happy moment. And then they went hand in hand, to the side of the room and punched a series of buttons on a panel—a simple way of ordering breakfast sent up the automatic shaft from the kitchens below.

Nada Stokes-Harding was also an author. She wrote poems—"back to nature stuff"—simple lyrics of the sea, of sunsets, of bird songs, of bright flowers and warm winds, of thrilling communion with Nature, and growing things. Men read her poems and called her a genius. Even though the whole world had grown up into a city, the birds were extinct, there were no wild flowers, and no one had time to bother about sunsets.

"Eric, darling," she said, "isn't it terrible to be cooped up here in this little flat, away from the things we both love?"

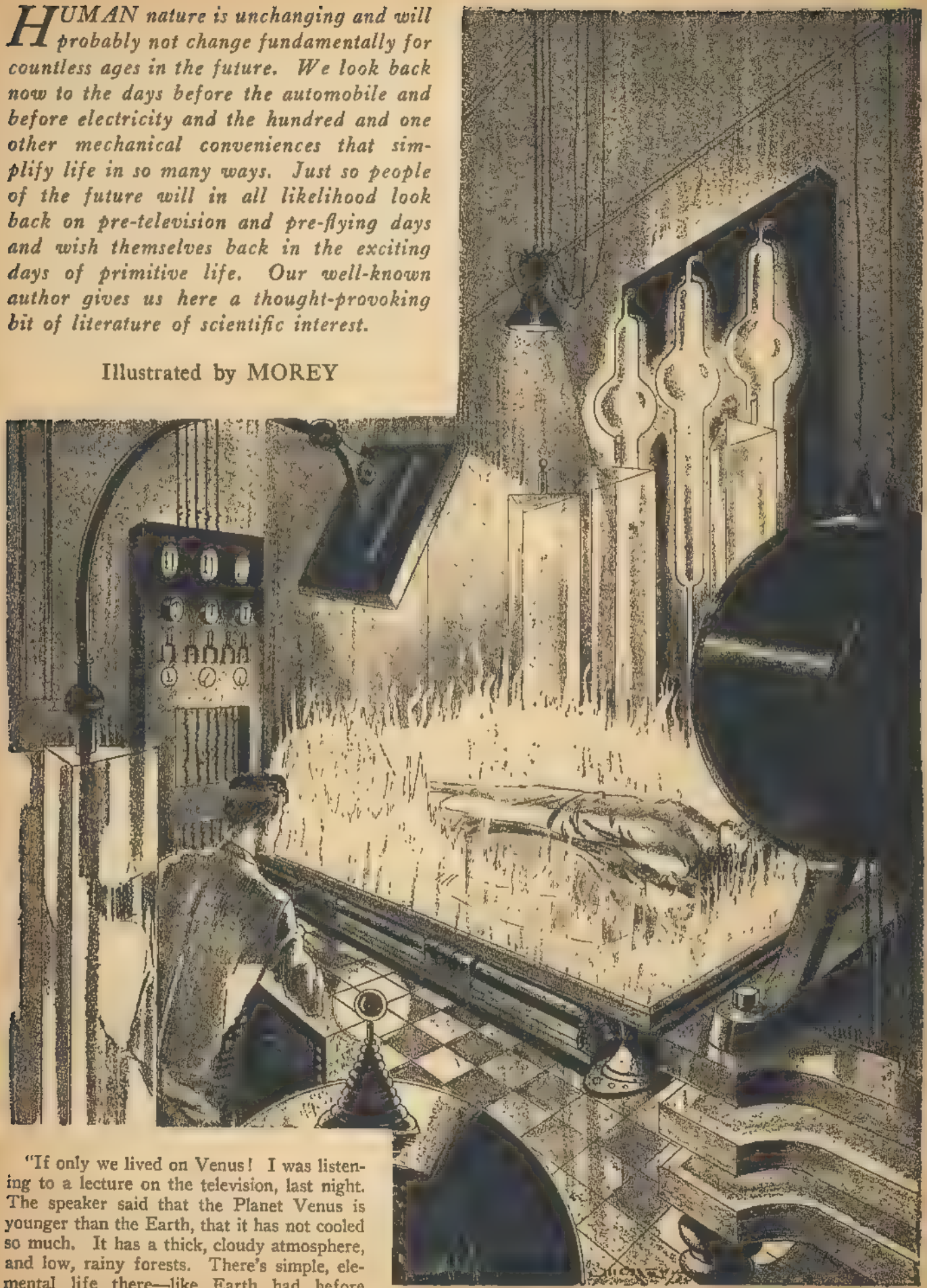
"Yes, dear. Civilization has ruined the world. If we could only have lived a thousand years ago, when life was simple and natural, when men hunted and killed their meat, instead of drinking synthetic stuff, when men still had the joys of conflict, instead of living under glass, like hot-house flowers."

"If we could only go somewhere——"

"There isn't anywhere to go. I write about the West, Africa, South Sea islands. But they were all filled up two hundred years ago. Pleasure resorts, sanatoriums, cities, factories."

HUMAN nature is unchanging and will probably not change fundamentally for countless ages in the future. We look back now to the days before the automobile and before electricity and the hundred and one other mechanical conveniences that simplify life in so many ways. Just so people of the future will in all likelihood look back on pre-television and pre-flying days and wish themselves back in the exciting days of primitive life. Our well-known author gives us here a thought-provoking bit of literature of scientific interest.

Illustrated by MOREY



"If only we lived on Venus! I was listening to a lecture on the television, last night. The speaker said that the Planet Venus is younger than the Earth, that it has not cooled so much. It has a thick, cloudy atmosphere, and low, rainy forests. There's simple, elemental life there—like Earth had before civilization ruined it."

"Yes, Kingsley, with his new infra-red ray

Suddenly there was a sharp tingling sensation where they touched the polished surface.

telescope, that penetrates the cloud layers of the planet, proved that Venus rotates in about the same period as Earth; and it must be much like Earth was a million years ago."

"Eric, I wonder if we could go there! It would be so thrilling to begin life like the characters in your stories, to get away from this hateful civilization, and live natural lives. Maybe a rocket——"

The young author's eyes were glowing. He skipped across the floor, seized Nada, kissed her ecstatically. "Splendid! Think of hunting in the virgin forest, and bringing the game home to you! But I'm afraid there is no way. —Wait! The Cosmic Express!"

"The Cosmic Express?"

"A new invention. Just perfected a few weeks ago, I understand. By Ludwig Von der Valls, the German physicist."

"I've quit bothering about science. It has ruined nature, filled the world with silly, artificial people, doing silly, artificial things."

"But this is quite remarkable, dear. A new way to travel—by ether!"

"By ether!"

"Yes. You know of course that energy and matter are interchangeable terms; both are simply etheric vibration, of different sorts."

"Of course. That's elementary." She smiled proudly. "I can give you examples, even of the change. The disintegration of the radium atom, making helium and lead and *energy*. And Millikan's old proof that his Cosmic Ray is generated when particles of electricity are united to form an atom."

"Fine! I thought you said you weren't a scientist." He glowed with pride. "But the method, in the new Cosmic Express, is simply to convert the matter to be carried into power, send it out as a radiant beam and focus the beam to convert it back into atoms at the destination."

"But the amount of energy must be terrific——"

"It is. You know short waves carry more energy than long ones. The Express Ray is an electromagnetic vibration of frequency far higher than that of even the Cosmic ray, and correspondingly more powerful and more penetrating."

The girl frowned, running slim fingers through golden-brown hair. "But I don't see how they get any recognizable object, not even how they get the radiation turned back into matter."

"The beam is focused, just like the light that passes through a camera lens. The photographic lens, using light rays, picks up a picture and reproduces it again on the plate—just the same as the Express Ray picks up an object and sets it down on the other side of the world.

"An analogy from television might help. You know that by means of the scanning disc, the picture is transformed into mere rapid fluctuations in the brightness of a beam of light. In a parallel manner, the focal plane of the Express Ray moves slowly through the object, progressively, dissolving layers of the thickness of a single atom, which are accurately reproduced at the other focus of the instrument—which might be in Venus!

"But the analogy of the lens is the better of the two. For no receiving instrument is required, as in television. The object is built up of an infinite series of plane layers, at the focus of the ray, no matter where that may be. Such a thing would be impossible with radio apparatus, because even with the best beam transmission, all but a tiny fraction of the power is lost, and power is required to rebuild the atoms. Do you understand, dear?"

"Not altogether. But I should worry! Here comes breakfast. Let me butter your toast."

A bell had rung at the shaft. She ran to it, and returned with a great silver tray, laden with dainty dishes, which she set on a little side table. They sat down opposite each other, and ate, getting as much satisfaction from contemplation of each other's faces as from the excellent food. When they had finished, she carried the tray to the shaft, slid it in a slot, and touched a button—thus disposing of the culinary cares of the morning.

She ran back to Eric, who was once more staring distastefully at his typewriter.

"Oh, darling! I'm thrilled to death about the Cosmic Express! If we could go to Venus, to a new life on a new world, and get away from all this hateful conventional society——"

"We can go to their office—it's only five minutes. The chap that operates the machine for the company is a pal of mine. He's not supposed to take passengers except between the offices they have scattered about the world. But I know his weak point——"

Eric laughed, fumbled with a hidden spring under his desk. A small polished object, gleaming silvery, slid down into his hand.

"Old friendship, *plus* this, would make him—like spinach."

FIVE minutes later Mr. Eric Stokes-Harding and his pretty wife were in street clothes, light silk tunics of loose, flowing lines—little clothing being required in the artificially warmed city. They entered an elevator and dropped thirty stories to the ground floor of the great building.

There they entered a cylindrical car, with rows of seats down the sides. Not greatly different from an ancient subway car, except that it was air-tight, and was hurled by magnetic attraction and repulsion through a tube exhausted of air, at a speed that would have made an old subway rider gasp with amazement.

In five more minutes their car had whipped up to the base of another building, in the business section, where there was no room for parks between the mighty structures that held the unbroken glass roofs two hundred stories above the concrete pavement.

An elevator brought them up a hundred and fifty stories. Eric led Nada down a long, carpeted corridor to a wide glass door, which bore the words:

COSMIC EXPRESS

stenciled in gold capitals across it.

As they approached, a lean man, carrying a black bag, darted out of an elevator shaft opposite the door, ran across the corridor, and entered. They pushed in after him.

They were in a little room, cut in two by a high brass grill. In front of it was a long bench against the wall, that reminded one of the waiting room in an old railroad depot. In the grill was a little window, with a lazy, brown-eyed youth leaning on the shelf behind it. Beyond him was a great, glittering piece of mechanism, half hidden by the brass. A little door gave access to the machine from the space before the grill.

The thin man in black, whom Eric now recognized as a prominent French heart-specialist, was dancing before the window, waving his bag frantically, raving at the sleepy boy.

"Queek! I have tell you zee truth! I have zee most urgent necessity to go queekly. A patient I have in Paree, zat ees in zee most creetical condition!"

"Hold your horses just a minute, Mister. We got a client in the machine now. Russian diplomat from Moscow to Rio de Janeiro. . . . Two hundred seventy dollars and eighty cents, please. . . . Your turn next. Keep cool, you'll be there before you know it. Remember this is just an experimental service. Regular installations all over the world in a year. . . . Ready now. Come on in."

The youth took the money, pressed a button. The door sprang open in the grill, and the frantic physician leaped through it.

"Lie down on the crystal, face up," the young man ordered. "Hands at your sides, don't breathe. Ready!"

He manipulated his dials and switches, and pressed another button.

"Why, hello, Eric, old man!" he cried. "That's the lady you were telling me about? Congratulations!" A bell jangled before him on the panel. "Just a minute. I've got a call."

He punched the board again. Little bulbs lit and glowed for a second. The youth turned toward the half-hidden machine, spoke courteously.

"All right, madam. Walk out. Hope you found the transit pleasant."

"But my Violet! My precious Violet!" a shrill female voice came from the machine. "Sir, what have you done with my darling Violet?"

"I'm sure I don't know, madam. You lost it off your hat?"

"None of your impertinence, sir! I want my dog."

"Ah, a dog. Must have jumped off the crystal. You can have him sent on for three hundred and——"

"Young man, if any harm comes to my Violet—I'll—I'll—I'll appeal to the Society for the Prevention of Cruelty to Animals!"

"Very good, madam. We appreciate your patronage."

The door flew open again. A very fat woman, puffing angrily, face highly colored, clothing shimmering with artificial gems, waddled pompously out of the door through which the frantic French doctor had so recently vanished. She rolled heavily across the room, and out into the corridor. Shrill words floated back:

"I'm going to see my lawyer! My precious Violet—"

The sallow youth winked. "And now what can I do for you, Eric?"

"We want to go to Venus, if that ray of yours can put us there."

"To Venus? Impossible. My orders are to use the Express merely between the sixteen designated stations, at New York, San Francisco, Tokio, Lon——"

"See here, Charley," with a cautious glance toward the door, Eric held up the silver flask. "For old time's sake, and for this——"

The boy seemed dazed at sight of the bright flask. Then, with a single swift motion, he snatched it out of Eric's hand, and bent to conceal it below his instrument panel.

"Sure, old boy. I'd send you to heaven for that, if you'd give me the micrometer readings to set the ray with. But I tell you, this is dangerous. I've got a sort of television attachment, for focusing the ray. I can turn that on Venus—I've been amusing myself, watching the life there, already. Terrible place. Savage. I can pick a place on high land to set you down. But I can't be responsible for what happens afterward."

"Simple, primitive life is what we're looking for. And now what do I owe you——"

"Oh, that's all right. Between friends. Provided that stuff's genuine! Walk in and lie down on the crystal block. Hands at your sides. Don't move."

The little door had swung open again, and Eric led Nada through. They stepped into a little cell, completely surrounded with mirrors and vast prisms and lenses and electron tubes. In the center was a slab of transparent crystal, eight feet square and two inches thick, with an intricate mass of machinery below it.

Eric helped Nada to a place on the crystal, lay down at her side.

"I think the Express Ray is focused just at the surface of the crystal, from below," he said. "It dissolves our substance, to be transmitted by the beam. It would look as if we were melting into the crystal."

"Ready," called the youth. "Think I've got it for you. Sort of a high island in the jungle. Nothing bad in sight now. But, I say—how're you coming back? I haven't got time to watch you."

"Go ahead. We aren't coming back."

"Gee! What is it? Elopement? I thought you were married already. Or is it business difficulties? The Bears did make an awful raid last night. But you better let me set you down in Hong Kong."

A bell jangled. "So long," the youth called.

Nada and Eric felt themselves enveloped in fire. Sheets of white flame seemed to lap up about them from the crystal block. Suddenly there was a sharp tingling sensation where they touched the polished surface. Then blackness, blankness.

THE next thing they knew, the fires were gone from about them. They were lying in something extremely soft and fluid; and warm rain was beating in their faces. Eric sat up, found himself in a mud-puddle. Beside him was Nada, opening her eyes and struggling up, her bright garments stained with black mud.

All about rose a thick jungle, dark and gloomy—and very wet. Palm-like, the gigantic trees were, or fern-like, flinging clouds of feathery green foliage high against a somber sky of unbroken gloom.

They stood up, triumphant.

"At last!" Nada cried. "We're free! Free of that hateful old civilization! We're back to Nature!"

"Yes, we're on our feet now, not parasites on the machines."

"It's wonderful to have a fine, strong man like you to trust in, Eric. You're just like one of the heroes in your books!"

"You're the perfect companion, Nada. . . . But now we must be practical. We must build a fire, find weapons, set up a shelter of some kind. I guess it will be night, pretty soon. And Charley said something about savage animals he had seen in the television."

"We'll find a nice dry cave, and have a fire in front of the door. And skins of animals to sleep on. And pottery vessels to cook in. And you will find seeds and grown grain."

"But first we must find a flint-bed. We need flint for tools, and to strike sparks to make a fire with. We will probably come across a chunk of virgin copper, too—it's found native."

Presently they set off through the jungle. The mud seemed to be very abundant, and of a most sticky consistence. They sank into it ankle deep at every step, and vast masses of it clung to their feet. A mile they struggled on, without finding where a provident nature had left them even a single fragment of quartz, to say nothing of a mass of pure copper.

"A darned shame," Eric grumbled, "to come forty million miles, and meet such a reception as this!"

Nada stopped. "Eric," she said, "I'm tired. And I don't believe there's any rock here, anyway. You'll have to use wooden tools, sharpened in the fire."

"Probably you're right. This soil seemed to be of alluvial origin. Shouldn't be surprised if the native rock is some hundreds of feet underground. Your idea is better."

"You can make a fire by rubbing sticks together, can't you?"

"It can be done—easily enough, I'm sure. I've never tried it, myself. We need some dry sticks, first."

They resumed the weary march, with a good fraction of the new planet adhering to their feet. Rain was still falling from the dark heavens in a steady, warm downpour. Dry wood seemed scarce as the proverbial hen's teeth.

"You didn't bring any matches, dear?"

"Matches! Of course not! We're going back to Nature."

"I hope we get a fire pretty soon."

"If dry wood were gold dust, we couldn't buy a hot dog."

"Eric, that reminds me that I'm hungry."

He confessed to a few pangs of his own. They turned their attention to looking for banana trees, and coconut palms, but they did not seem to abound in the Venerian jungle. Even small animals that might have been slain with a broken branch had contrary ideas about the matter.

At last, from sheer weariness, they stopped, and gathered branches to make a sloping shelter by a vast fallen tree-trunk.

"This will keep out the rain—maybe——" Eric said hopefully. "And tomorrow, when it has quit raining—I'm sure we'll do better."

They crept in, as gloomy night fell without. They lay in each other's arms, the body warmth oddly comforting. Nada cried a little.

"Buck up," Eric advised her. "We're back to nature—where we've always wanted to be."

With the darkness, the temperature fell somewhat, and a high wind rose, whipping cold rain into the little shelter, and threatening to demolish it. Swarms of mosquito-like insects, seemingly not inconvenienced in the least by the inclement elements, swarmed about them in clouds.

Then came a sound from the dismal stormy night, a hoarse, bellowing roar, raucous, terrifying.

Nada clung against Eric. "What is it, dear?" she chattered.

"Must be a reptile. Dinosaur, or something of the sort. This world seems to be in about the same state as the earth when they flourished there. . . . But maybe it won't find us."

The roar was repeated, nearer. The earth trembled beneath a mighty tread.

"Eric," a thin voice trembled. "Don't you think—it might have been better— You know the old life was not so bad, after all."

"I was just thinking of our rooms, nice and warm and bright, with hot foods coming up the shaft whenever we pushed the button, and the gay crowds in the park, and my old typewriter."

"Eric?"

"Yes, dear."

"Don't you wish—we had known better?"

"I do." If he winced at the "we" the girl did not notice.

The roaring outside was closer. And suddenly it was answered by another raucous bellow, at considerable distance, that echoed strangely through the forest. The fearful sounds were repeated, alternately. And always the more distant seemed nearer, until the two sounds were together.

And then an infernal din broke out in the darkness. Bellows. Screams. Deafening shrieks. Mighty splashes, as if struggling Titans had upset oceans. Thunderous crashes, as if they were demolishing forests.

Eric and Nada clung to each other, in doubt whether to stay or to fly through the storm. Gradually the sound of the conflict came nearer, until the earth shook beneath them, and they were afraid to move.

Suddenly the great fallen tree against which they had erected the flimsy shelter was rolled back, evidently by a chance blow from the invisible monsters. The pitiful roof collapsed on the bedraggled humans. Nada burst into tears.

"Oh, if only—if only——"

Suddenly flame lapped up about them, the same white fire they had seen as they lay on the crystal block. Dizziness, insensibility overcame them. A few moments later, they were lying on the transparent table in the Cosmic Express office, with all those great mirrors and prisms and lenses about them.

A bustling, red-faced official appeared through the door in the grill, fairly bubbling apologies.

"So sorry—an accident—inconceivable. I can't see how he got it! We got you back as soon as we could find a focus. I sincerely hope you haven't been injured."

"Why—what—what——"

"Why I happened in, found our operator drunk. I've no idea where he got the stuff. He muttered something about Venus. I consulted the auto-register, and found two more passengers registered here than had been recorded at our other stations. I looked up the duplicate beam coordinates, and found that it had been set on Venus. I got men on the television at once, and we happened to find you.

"I can't imagine how it happened. I've had the fellow locked up, and the 'dry-laws' are on the job. I hope you won't hold us for excessive damages."

"No, I ask nothing except that you don't press charges against the boy. I don't want him to suffer for it in any way. My wife and I will be perfectly satisfied to get back to our apartment."

"I don't wonder. You look like you've been through—I don't know what. But I'll have you there in five minutes. My private car——"

* * * *

Mr. Eric Stokes-Harding noted author of primitive

life and love, ate a hearty meal with his pretty spouse, after they had washed off the grime of another planet. He spent the next twelve hours in bed.

At the end of the month he delivered his promised story to his publishers, a thrilling tale of a man marooned on Venus, with a beautiful girl. The hero made stone tools, erected a dwelling for himself and his mate, hunted food for her, defended her from the mammoth saurian monsters of the Venerian jungles.

The book was a huge success.

THE END.

READERS' VOTE OF PREFERENCE

Stories I like:

1.....

2.....

3.....

Why:

.....

.....

Stories I do not like:

1.....

2.....

3.....

Why:

.....

.....

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In this department we shall discuss, every month, topics of interest to readers. The editors invite correspondence on all subjects directly or indirectly related to the stories appearing in this magazine. In case a special personal answer is required, a nominal fee of 25c to cover time and postage is required.

REPRINTS STILL WANTED

Editor, AMAZING STORIES:

Just a few lines to tell you of several stories which I have enjoyed immensely. The first one is "The Grim Inheritance" by Carl Clausen. In my opinion, which may not amount to much, this story is a masterpiece. It held me from beginning to end. There was just one wrong thing about the story: It was far too short. If he has any more to offer, get them.

Your one and only play published to date, "Just Around the Corner," by Raymond Knight, hit the right spot with me. How about several more plays? Especially by Raymond Knight.

And now I'm going to take you with me on a little trip into the past to see again a grand short story. All of which is just a way of introducing "The Talking Brain" by M. H. Hasta. I lived with Murtha in that story through his experiments, discoveries and disappointments. And I lived with poor Vinton through his torture. You said in the readers' columns that you might republish old favorites which have already appeared in AMAZING STORIES. I do not approve of this but, if you ever do, please print "The Talking Brain." By the way, why not try to persuade Mr. Hasta to write another story? I doubt if it can even approach the glory which the first story has attained but, even so, it ought to be great.

How do you spell A. Merritt correctly? Merit? That's one way. Perhaps you know what I am hinting at. It is this. A story is wanted by him. Pardon me, it's needed before we all forget how to spell Merritt, one of the *real* writers.

And now we come to "The Second Deluge," by Garret P. Serviss, a story which, in my opinion, captures all honors. I even include "A Columbus of Space," "The Moon Pool" and the mighty "Skylark of Space," in this category.

Mr. Editor, why did you commit the awful crime of not printing the stories of H. G. Wells in many back issues? And while I'm on the subject, how about Jules Verne? S'awful. Several of your authors have made and are making the mistake of creating a marvel for a hero. The hero almost dies, is captured by the ferocious enemy who intends to destroy the world, escapes by the margin of a microbe's whisker, saves the world from a terrible death, kisses the girl and becomes the lord of the Earth's millions. Show me one story by Verne or Wells which have these kinds of heroes. One reason why their works are popular is that there are living people in their books.

Before I close, I would like to show you a coincidence that has occurred in A. S. Do you remember the story, "Absolute Zero," by Colter? Well, *Colter*, in Jewish, means colder, "Absolute Zero" is a frigid subject and, moreover, the story appeared in the January, 1929 issue, a cold month. Brrrr.

Isidore Manzon,
544 Myrtle Ave.,
Brooklyn, N. Y.

(If our correspondents could see the number of manuscripts of thoroughly good stories we have awaiting publication, they would understand why we are not giving reprints. We have found that reprints of stories by Jules Verne and H. G. Wells are not popular with our readers. They seem to feel that these stories are too easily accessible to bear reprinting. Garret P. Serviss is dead. Mr. Merritt will enjoy your spelling of his name we are sure. There are very live people in our stories. It is not necessary to give titles as all of them are full of human nature. We avoid dry stories, giving more character than many non science stories.—EDITOR.)

THE SCIENCE CORRESPONDENCE CLUB

Editor, AMAZING STORIES:

I wish to reply to some of the inquiries made to you regarding the Science Correspondence Club:

First, there are no paid officers in the Club.

The aims of the Club are to promote science by actually making experiments, by study, and through correspondence, also by organizing branches throughout the country where members can get together, exchange ideas, put into practice their theories.

A library is maintained by the Club for the use of the members; this library consists only of books pertaining to science and science fiction, also a collection of science fiction magazines.

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Application blanks can be obtained either from the writer, or from the Secretary, Raymond A. Palmer, 1431—38th Street, Milwaukee, Wis.

F. B. Eason, President,
Science Correspondence Club,
400 Jefferson Ave.,
East Point, Ga.

The Globoid Terror

By R. F. Starzl

(*Continued from page 705*)

A spot of light fell on Crombie's chest. For a second he stared at it in surprise. For when such a light struck a man he was supposed to be dead. The tinkle of broken glass near by brought realization. The indicator light of that particular weapon was out of order—the invisible twin D'Arsonval beams had missed their mark.

With a shout Crombie leaped to the protection of a huge motor near by. Crackling sparks playing about the expansion spheres showed where the beams were impinging. Presently he found one of his enemies, trying to bring his weapon to bear from a conveyor pole outside. That man went down. The officer put on his infra-red goggles, and was gratified to see several more marksmen trying for him from the dead stumps of giant ferns. These, too, stumbled to the frozen ground. Crombie swept the jungle, hoping that nothing in the compound would get into his weapon's unlimited range. There were bestial cries, crashes, the sough of huge, invisible wings.

Crombie cautiously peered out of a rear door. Evidently this building was a considerable distance from the one he had entered several hours ago. A cautious sweep of the projector brought the snap of electricity but no sign of an ambuscade. He crept to the front and ascertained that there was no man alive there. Only seven were dead, showing here and there ghastly ash patches.

"That leaves De Maine and two of his men, not to say anything about old Burgess and his daughter, and not counting the natives," he muttered.

He left the ice-covered area of the mines and trudged back toward the compound. He had hopes of intercepting the party that would be returning from the compound, but could not find any green outcropping.

The residence seemed deserted. Not a servant was in sight. Crombie burned off the lock of a closed door, kicked it open. It led into the factor's library. It disclosed Burgess, too, just recovering from a blow on the head.

"They're gone!" the shaken old man wailed. "De Maine, the scoundrel! He took Verna with him."

"You mean she went with him," Crombie amended dryly.

"I mean he forced her," the old man insisted. "One of the natives gave De Maine away. He's the one who's been robbing the company. Putting in a percentage of chemical imitations with the real carbons, keeping the rest. I trusted him—never examined them closely. The chemical imitations volatilized over night, leaving the safe short, yet the seals were unbroken. He came here a little while ago—we denounced him. He laughed—struck me—must have taken her with him——"

"Quick, which way to the green outcropping?"

"Take the corduroy away from the mine, toward the sea."

So that explained why he had not met them. There was another corduroy. Crombie ran, unlimbering his projector for action. He found the outcrop, its color due to a thick, slippery moss. Several times he nearly slipped off into the morass, each time barely finding a hold for his lacerated fingers. But the distance was short. In a few minutes his feet trod the comparatively firm sand of the beach.

The goggles disclosed three figures running toward a huge, egg-shaped body nestling in the sand beside a rock. That would be the *Spittin' Devil*, De Maine's flying ovoid, beside Despair Rock. They were dragging an unwilling fourth—the girl. The officer rapidly overtook the struggling four. By the time they had reached the rock he was within a hundred feet of them, invisible to them, but able to see plainly.

Suddenly the four stopped. Something had come out of the sea. Crombie's scalp prickled and a shudder coursed down his spine. He recognized that half-mythical sea-monster, which, for hundreds of years thereafter, was to make human settlement on the shores of the Venerian seas a risky gamble.

It came toward its victims with a slow, rhythmic flowing motion, laying a part of its amorphous body on the sand and drawing the rest after it in a deceptive, slow-seeming movement. With horrible, remorseless ease it traversed that short stretch of beach. Then, as by command, the three men drew their projectors, trained them on that shimmering, uncertain spheroid of terror. The girl, released, shrieked and ran toward Crombie. As his form loomed up out of the murky fog she tried to evade him, but he caught her roughly, held her for an instant.

"Get back to the compound and tell your father to keep away from here," he commanded. He turned his attention to the tragedy on the water's edge.

Like figures in a nightmare, the doomed men still stood immovable, their projectors held on the menace, but the beams passed *through* the transparent membrane and phosphorescent contents. They could not harm it. For one brief instant, evanescent as the dissolving clouds on the surface of a bubble, the wretches stared gauntly at their doom. In the next, the men turned to run, and like a fleeting shadow, the sea terror rolled after them, encircling them, blotting them out, obliterating them. For another heartbeat it paused, vibrating like a mountain of disturbed jelly, then leisurely rolled back into the sea.

Where it had poised quivering, there was a shallow depression, quickly filling with water. There were also a few coins, dental fillings of gold, keys, and a few handfuls of the priceless gray carbons.

THE END

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THE MONTHLY MAGAZINE APPROVED OF. A LITTLE ROMANCE WELCOMED. SOME LETTERS IN THE CORRESPONDENCE COLUMN COMMENTED ON

Editor, AMAZING STORIES:

Have just finished reading the May and June issues of AMAZING STORIES. I had been rather busy, what with school work and all, and in a breathing space afforded by being a trifle ahead of my work, I decided to catch up on my reading. As usual, I read the Discussions Column first.

Mr. Robert Dalton wants to know why you do not publish AMAZING STORIES twice a month and omit all drawn-out serials. Most of our cheaper literature comes out twice a month and what is the consequence? All the stories are nearly alike and the editors have not time to efficiently and intelligently supervise the material they allow to be printed. Unless they have an excellent staff of authors and editors, their stuff is dry, dead and rotten. Once a month is just about all a reader can assimilate intelligently.

Now the burden that some of the readers seem to carry—romance. Why shouldn't "females," as Dalton calls them, be included in the science fiction stories? Remember, "Love makes the world go around," and also gives a rosy atmosphere to an otherwise cold, machine-like scientific story.

I nearly forgot the serials. As to their being drawn out, I do not remember one that has been longer than three instalments, which I consider a nice length for serials.

The correspondence page for "letter-hungry persons" is aptly taken care of in "Discussions." I believe if that does not suffice, there is the Science Correspondence Club, which is now an established institution, and these persons can write and receive letters to their heart's content.

Mr. P. Schuyler Miller's letter was extremely interesting. Here's hoping we hear from him again.

To Mr. J. B. Bridgeford: Your supposition that AMAZING STORIES is read by thousands of American youths is correct, but do you think that the kind of stories you object to, *viz.*, "The Ice Man," would have much, if any effect on them? On the contrary, I think the type of youth that reads this magazine has the imagination and the power of mind to enjoy these stories and that also enables them to pick out the salient and educational ideas expressed and to cast off the sordid ones.

"The Gostak and the Doshes" was a remarkably satirical and humorous story of man. But what else could be expected from Dr. Breuer?

What happened to Clare Winger Harris? I've missed her stories for some time and when I say that I wish you would print some of her stories again, I think that I express the sentiments of not a few AMAZING STORIES readers.

By the way, the meaning of the decorative title-block for Discussions has just come to me. Brickbats and Roses! Great!

The quality and quantity of the stories printed in AMAZING STORIES for the last three months really deserves some comment, so let me echo the feelings of the others and say, thank you.

What do you mean by "look for slight inconsistencies in Mr. Verrill's stories"? Please explain, I think they're great.

Darrel Richards,
8720 Hamilton Ave.,
Detroit, Michigan

(We are always glad to hear that one of our readers goes to the Discussions Columns first. It is quite interesting to see the thought that many of our readers put into the letters which they write to us, and we sometimes wonder how many realize the amount of writing there is involved in the five or six pages of fine print which our Discussions Columns represent. Your analysis of the once-a-month or twice-a-month question as it may be put, is quite ingenious. We have, however, no difficulty in getting good stories and we promise you that whatever happens in the future the standard of AMAZING STORIES will never be impaired. It is a profound mystery to the Editors, how any exception can be taken to such a story as "The Ice Man." We sometimes think that some members of the fair sex might be benefited by laying its flattering (or otherwise) unction to their souls. You will never be disappointed in Dr. Breuer. Your expressions about Mrs. Harris, we hope will lead to her sending us one of her admirable stories. It is a coincidence, but as we read what you say about Mr. Verrill's stories the gentleman himself is with us, but we will not show him this, lest we make him blush. Mr. Verrill is a distinctive writer. What would be inconsistencies in matter of fact treatises will often appear in highly imaginative fiction.—EDITOR.)

SUPERSTITION, ASTROLOGY AND CREDULOUS HUMANITY

Editor, AMAZING STORIES:

I have read every story published in your magazine since its appearance in April, 1926, and have a complete file of the 47 monthly issues, and all the quarterlies and annual besides. Should not that qualify me as an AMAZING STORIES fan, entitled to express an opinion? It is not my purpose, however, to indulge in an appraisal of your fiction—the fact that I have read all of it, enjoyed most of it, and been bored by very little of it is proof that I consider it entertaining, for the most part instructive, and frequently amusing, such as the clever satire in Rementer's "The Time Deflector."

Tales of interplanetary travel, lost Atlantises, and the Fourth Dimension have advanced far since Verne's "A Journey to the Moon" and "Twenty Thousand Leagues Under the Sea," Bulwer Lytton's "The Coming Race," Burroughs' Martian stories, and other early fantasies of these pioneers of scientifiction, with Poe, Wells and a few other choice souls. They were the forerunners of a great school of Verrills, Vincents, Breuers, Kellers, and all the bright galaxy of visionaries who are blazing new trails for us through both the macrocosm and the microcosm. I have been charmed and thrilled by such stories, as "The Moon Pool"—in my humble opinion the greatest story you have ever published for sheer daring and adventure, although "The Skylark of Space," "The Other Side of the Moon," "Beyond the Green Prism," and several others closely approach it. Your exploitation of science garbed in the popular habiliments of fiction has done much to create a new cult in literature, and the flood of books and new magazines devoted to it should be considered by you as the sincerest flattery. Only a negligible number of the fanciful predictions made by your writers will ever be realized. They are for the most part shot through with fallacy, inconsistency, impossibility and pseudo-science, but that does not detract in the least from their grip upon the imagination, and their appeal to the romantic which some of your critics find objectionable.

But that is not what I started out to say. By way of introduction I wanted to assure you that I like your stories, approve your illustrations, and have no fault to find with your format (I am a printer, writer and publisher myself). I do wish, however, to protest most vigorously against your countenancing such ridiculous fakes as astrology, fortune-telling, palmistry and the like by publishing their advertisements. Stories are accepted as fiction, but advertisements are supposed to be honest and trustworthy. And no one knows better than you that astrology has long been discarded by the scientific world and classed with witchcraft, sorcery, necromancy, and other superstitions that are only throw-backs of barbarism. Then why permit the charlatans who practice it to appeal to the credulous? No one knows better than you that combinations of planets or constellations cannot possibly have any bearing whatever upon the lives of those born at any particular time. No one knows better than you that those who pretend to foretell the future, by any means, natural or occult, or to answer the questions "Will you be lucky? Will you win in love? Will your investments be profitable?" (I quote) are plain and unqualified liars and mountebanks preying upon the credulity of the ignorant and the superstitious. These things have not even the semblance of pseudo-science to justify them. Let us clean up our scientifiction by banishing the last remaining purveyors of the inane and silly superstitions that cursed the Dark Ages and have kept the savage nations of the earth savage. Write an editorial on the curse of astrology and leave its advertisements out of your pages.

Clio Harper,
Little Rock, Arkansas.

(We are very glad indeed to publish your letter and we will take pleasure in calling the attention of the manager of our advertising department to your very excellent remarks about astrology and similar things, absolutely disbelieved in by the writer of this comment. To those of us who entirely disbelieve in it, it seems impossible that there can be more than a very few believers in such superstitions, but it is said by those who are supposed to know that there are an immense number of people victimized by these beliefs and by the practitioners of them, who make a comfortable living, with their practices.—EDITOR.)

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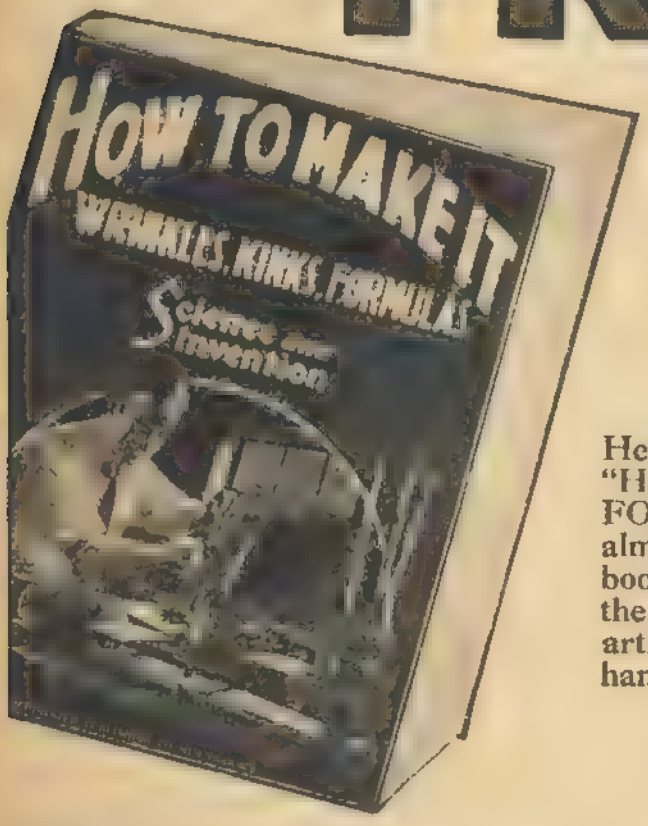

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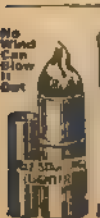

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REPRINTS WANTED AND COMPARED WITH ORIGINAL STORIES

Editor, AMAZING STORIES:

AMAZING STORIES has certainly improved a great deal since the magazine changed hands, especially in regard to illustrations. Wesso, of course, is the best artist you have. However, in the latest issue there are only three illustrations by him. Is it possible that your rivals are going to steal him away from you as they did Paul? I hope not.

Now to get down to the real purpose of this letter. You have printed many letters from readers who demand reprints. You have given all sorts of excuses and reasons for not publishing stories which have been printed before. These reasons, I consider illogical and unfair.

You state that your main objection to reprints is that you are receiving so many good (?) original stories that there is no room for reprints.

My answer to that statement is this. The serials now being published *may* be good, but some of the stories available for reprint purposes are infinitely better than they are. In fact, most of the novels and serials now being printed are rotten! I especially refer to the following stories: "Out of the Void," "The Secret Kingdom," and "Beyond the Green Prism." The rest of the serials are only fair.

Another of your objections is that readers have disapproved of reprints that you have published in the past. In that you are wrong, Mr. Editor. It is true that the stories of H. G. Wells and Jules Verne were quite unpopular. However, it was you and not the readers, who insisted on reprinting the dull, uninteresting, and out-of-date stories of the two above writers. When I say I want reprints, I emphatically exclude the works of Wells and Verne.

You seem to forget that the most popular story in AMAZING STORIES was a reprint. I refer to "The Moon Pool." I challenge you to name me five new stories which were more popular than the following: "The Land that Time Forgot," "The Second Deluge," "The Face in the Abyss," "Treasures of Tantalus" and "Ralph 124C 41 +," all of which are reprints.

Again you say that the stories of Serviss, Burroughs, and Cummings are available in any library. Again you err. I have been to all the libraries in this vicinity and not one of the books written by these authors is in them.

In the July issue a reader has called your attention to the promises you made regarding the publishing of reprints. And you answer him: "Promises are like pie crusts, made only to be broken!" If that is your real attitude toward promises, then I lose all my respect for you.

This letter is rather long, but it is sincere. I hope that you will print it in "Discussions," in order that you can answer my arguments. I believe that I have smashed all your objections to reprints. If you don't think so, please tell me where I have erred.

At any rate, I hope you will change your mind regarding reprints and have at least one every year. The stories of Burroughs, Serviss, Cummings and Merritt are preferable.

Michael Fogaris,
157 Fourth St.,
Passaic, N. J.

(Please do not take our quotation of a classic proverb as a serious statement of our feeling about pledges. We certainly do not want to lose your respect for us. We still have the stories which we promised, but it must take time to get them into shape for publication. We now have on hand a quantity of original stories and the mere fact of there being so many really good ones, as for instance the story we plan to start in the November issue, operates to cut down the number of reprints. We will think seriously about what you say, however. It is a serious step and needs time for deliberation.—EDITOR.)

A LETTER OF INTERESTING CRITICISM OF OUR AUTHORS

Editor, AMAZING STORIES:

I have been reading your magazine for quite a while and as yet have not written in to the so-called "Discussion" column, so I take this opportunity to toss flowers and brickbats at your publication.

In several stories, such as "The Message from Space," by David Speaker and "Tani of Ekkis" there are brought into the story translated manuscripts and messages that were written or sent forth in an unknown tongue. The author skips glibly over the translation of the manuscript in order not to let the reader see the weak part of it. If we are translating the manuscript we have absolutely nothing to work upon. We do not know that their terms of speech are the same as ours. We do not know how many letters there are in this strange alphabet. Even if we do get the key and translate it we will have numerous but meaningless groups of strange words. Yet the author says, "Having found the key to the mysterious manuscript, Jack Dalton easily translated it. It reads as follows——" There may actually be a way to translate these, but I am not familiar with it. If you know of one, would you kindly describe it for me?

In the July issue there were some good stories. The concluding part of Edmond Hamilton's story, "The Universe Wreckers" was great. Mr. Hamilton has a way of writing that is exceedingly interesting to the reader, even if his plots are monotonously similar. When he varies his plots, he produces an excellent story. "Evens of the Earth Guard" and "The Space Visitors," although in another magazine, are good examples of this.

A. Hyatt Verrill's story, "A Visit to Suari" was excellent, but only because of its originality. "The Message from Space" was good in spite of the slight error in the presentation. All that I can say about that great story of time-traveling, "Paradox +" is that it is better than its predecessor, "Paradox."

Impelled by curiosity, I catalogued and indexed the work of all of your authors since January, 1929, and rated each story until I got these impressions. David H. Keller is "not so hot." His good stories, like "The Human Termites" and the two "Conqueror" stories are mixed with numerous stories of psychological interest only, which have very little science in them. Miles J. Breuer, A. Hyatt Verrill, and Harl Vincent are rather good. But you have a new author who has put out just three stories that are A-1. So hold on to John W. Campbell, Jr. In my opinion, he is your best author.

Please do not print any of the much-demanded H. G. Wells stories as most of the readers have read them. The stories may be procured in the library and in the magazine are just occupying much-needed space.

I have heard so much about A. Merritt's story, "The Moon Pool" that I would like to secure a copy of it in book form. Could you tell me how to secure it?

Harold Applebaum,
1044 East 13th Street,
Brooklyn, N. Y.

(We admit that our authors indulge in a sort of poetic license in some of their details. To carry out the stories a little bit of the impossible has to be inserted in many cases, and certainly some of the characters appear to have an extraordinary ability for learning languages. We think you will have to allow them that power. Your remarks about Mr. Campbell are interesting in view of some other letters, which we have received, which criticized him unfavorably. Your other names are those of our highest grade authors. Dr. Breuer, a celebrated diagnostician, Mr. Verrill, a writer of some 50 books and an archeologist and ethnologist of wide reputation, and Harl Vincent, the nom-de-plume of an engineer holding a high position in one of the great engineering companies of this country, are typical of those who write for us.—EDITOR.)

OUR ARTISTS AND OUR PAPER

Editor, AMAZING STORIES:

Good morning, or maybe, it's afternoon! Well, here's A. S. in its 5th year, and it's not much better than when it started. The paper is rotten, the covers fall off; we only get 70 pages for 25¢, and the illustrations are terrible. By the way—where is PAUL? He is a real artist. His drawings were almost like photographs—they were so realistic, and clear in detail, and all of the Profs. weren't pictured as having whiskers either. Most of your illustrations now are very crude, and are not very clear. For instance, take a squint at page 23, April A. S., then look at one of Paul's drawings. Some difference, eh what? The illustration on the front is the only one worth looking at.

Speaking of mags in general, the *Saturday Evening Post* puts at least 100 pages of reading matter, good illustrations, good paper, and a mag that stays together, all for a jitney (5¢). other magazines have a lot of advertisements, but, before you can get advertisements, you must have a circulation and before you can get a circulation,

you must have quality, so the main thing is quality.

I think better paper, and one more story would increase your circulation quite a bit. Paper like you use in S. & I. would be a great improvement, and for crying out loud get rid of some of those Would Be Artists. Morey is one of the best artists.

Well, now that I have all that off my mind, and as you are probably getting hot and bothered, I'll give you a rose or two.

I have read A. S. and S. & I., both, since August, 1926, and intend to read them a few years longer unless they get worse. I haven't much to say concerning the stories. They were all A-1 stories. I especially like the interplanetary, fourth dimension, and radio stories, and the following are some of them: "The Moon Pool," "The Green Prism," "Behind the Pole," "The Metal Emperor," "The Skylark of Space," and "Ten Million Miles Sunward."

H. C. Adlington,
Schofield Barracks, Hawaii

(We have eighty pages of stories with their illustrations and any quantity of letters in the "Correspondence Columns" which many readers think are a most interesting part of the magazine. So you see, you are getting far more than seventy pages for your twenty-five cents. We have been using Paul, whom you admire so much, along with Morey and Wesso. According to a good many of our readers, the illustrations are as good as they have ever been and better. We are glad to note that the stories please you.—EDITOR.)

TRITON AND THE FORCE RAY IN "THE UNIVERSE WRECKERS"

Editor, AMAZING STORIES:

In July's issue of AMAZING STORIES there was a statement that puzzled me. In "The Universe Wreckers," it said, that when the force ray controls were destroyed, Triton immediately was forced out of the Solar System. If it took four years for the ray to reach the star it would take four years for the fact that the source of the ray had been cut off to be realized on the star. In that time the sun would have been destroyed. This fact is clearly explained in a story in the same book, "A Message from Space." The man who sent the message had been dead many years by the time it reached the earth. The power had been cut off at the source, but this did not affect the message in any way. Please explain this to me if I'm wrong.

Robert Hayman,
320 Jefferson Ave.,
Niagara Falls, N. Y.

(As far as the star you refer to is concerned, the story didn't care what became of it. Triton, the satellite of Neptune, was the one which could be disturbed, and as that would fly off into space like a rocket it would cease to affect the sun.—EDITOR.)

GASEOUS BEINGS IMPOSSIBLE

Editor, AMAZING STORIES:

In a recent issue of AMAZING STORIES I came across the statement—"gaseous beings are not impossible." The author goes ahead and gives some analogies. I don't quite remember the name of the story, but it was about a semi-gaseous animal called "the elementals."

There are several reasons why the existence of gaseous creatures are impossible. First of all, how would the organs, being composed of gases in a gaseous form keep from mingling with each other. Secondly—the creature due to the diffusion of gases would permeate the entire atmosphere. They would be unable to eat or handle any liquid or solids. The slightest breeze would scatter parts of their body everywhere. They would be highly susceptible to bacteria and heat, due to their tremendous surface exposed. Even if they had a protective outer shell, the gases of which their bodies would be composed would escape due to osmotic pressure.

Samuel H. Waltman and
Samuel Greenspan,
359 Grand Street,
New York City

(AMAZING STORIES is built up largely on the conception that it is unsafe to say that things are impossible in this world of ours. You can pick out the great discoveries of the last fifty years and you will find that the greatest of them fell under the category of "impossible." Our stories have abounded in 'impossibilities,' but wait fifty years and see what will happen.—EDITOR.)

"SHE CAN'T PLAY A NOTE"

"This'll be Funny" they shouted as she sat down to play — but a minute later...

"I GUESS we're stuck right here in the club for the afternoon," sighed Jane, as the rain began coming down in torrents.

"I suppose this means more bridge, and I'm tired of that," said John Thompson. "Can't we find something unusual to do?"

"Well, here comes Sally Barrow. She might offer a solution to the problem," suggested Jimmy Parsons.

Poor Sally! Unfortunately she was considerably overweight. Nevertheless the boys all *liked* Sally—she was so jolly and full of fun.

"Hello everybody," came Sally's cheery greeting, "What's new?"

"That's just it, Sally, we've just about reached the end of our rope," replied John.

"Would it surprise you if I played a tune or two for you on the piano?"

"You play, Sally? Don't be funny!" The very idea of Sally having talent in any direction struck everybody as a joke. However, Sally didn't mind being laughed at—as long as John Thompson didn't join in the laughter. Sally liked John—more than she cared to admit.

Sally walked nonchalantly over to the piano. Carelessly, she played a few chords. Then, just as if she had played for years, Sally broke into the latest Broadway hit. Her listeners couldn't believe their ears! Sally continued to play one lively tune after another.

Finally she rose from the piano. John Thompson was at her side immediately.

"Where did you learn? Who was your teacher?" John asked.

Sally's Secret

"You may laugh when I tell you," Sally explained. "But I learned to play at home, without a teacher. You see, I happened to see a U. S. School of Music advertisement. It offered a Free Demonstration Lesson, so I wrote for it. When it came and I saw how easy it all was, I sent for the complete course. Why, I was playing simple tunes by note right from the start. It was just as simple as A-B-C to follow the clear print and picture illustrations that came with the lessons. Now I can play many classics by note and most all the popular music."

Today, Sally is one of the most popular girls in her set. And we don't need to tell you that she and John are now engaged!

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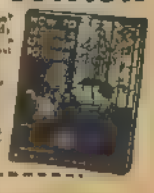

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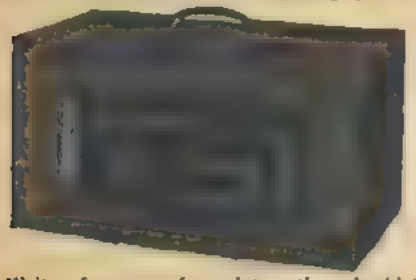

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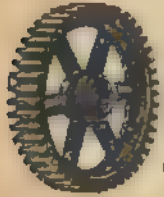

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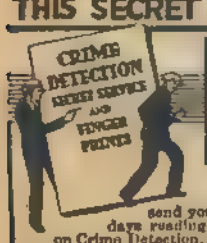

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"THE CAMPBELLS ARE COMING" IN THE WORDS OF THE OLD SCOTCH SONG

Editor, AMAZING STORIES:

I see that you have the intention of starting a real battle in the Discussions Column of your magazine. That comment on my last letter was certainly an invitation to warfare. Well, Dr. Smith gave his invitation in that foreword. Here's mine: I'm waiting anxiously for all comments, from anyone, and in particular Dr. Smith. If you are willing to use Discussions as a battle-ground—look out for stray bricks!

I might suggest that Dr. Smith save his biggest guns, and heaviest artillery for "Islands of Space." Also, any death rays, fourth order, ninth magnitude forces, and all higher order rays, forces and powers be reserved for it, *et seq.*

So far, "Skylark Three" has defied me as far as errors go. No new ones seem to show themselves, save that a ray screen, being purely vibration, as he seems to indicate, would be incapable of being either hot or cold. Consequently, the heating of a ray screen is a bit incomprehensible. However, the old errors are still there, the impossible planetary polyary, if that is what one would call a system of many suns, building on binary and ternary) system of the green suns, the improbable speed, I might say impossible. For allowing even that the mass of copper was completely destroyed, its energy can readily be figured by the formula $E = Mc^2$ where M is the mass of metal, C the velocity of light in cm. per sec. and E the energy in ergs. Similarly using the old kinetic energy formula, leaving out the mass increase correction, which makes the formula give a result faulty on the side of lowness, we can see that at the velocities Seaton attains, when $E = \frac{1}{2}Mv^2$, M the mass of the car in grams, v in cm. per sec. and E again in ergs—we can equate $M^1c^2 = \frac{1}{2}Mv^2$, letting M^1 be the mass of copper destroyed, and M the mass of the car. C is fixed—the velocity of light. It is easy, then, to solve for v—the maximum speed that amount of energy would permit. M^1 was said to be 400 pounds, and M, I believe, 4000 tons, or 8,000,000 pounds. The speed was decidedly limited by the energy of the bar—even material energy as Dr. Smith should properly have called it. (The term is not mine, but that of Sir James Jeans.)

But perhaps Dr. Smith disagrees with the Mc^2 formula for the energy of matter. He disagrees with other of Einstein's formulae. What then is his figure—he must have some?

Knocks—yes. But I want to say that in my opinion the Skylark Stories violate fewer principles of science than any others I have read in your magazine. When you have to call in Einstein and Sir James Jeans for help in locating the errors—it's a good yarn!

John W. Campbell, Jr.,
East Orange, N. J.

THE 300 M. P. H. AIRPLANE

Editor, AMAZING STORIES:

Have just bought and read the September issue of the best and most interesting magazine published.

Dr. Smith's 2nd installment of his "Skylark Three" is even better than the first installment—it is well above the average of your stories. Since 1927 I have, though "broke" many times—always managed to shell out 25 or 50 cents for either the Monthly or the Quarterly. All the stories suit some one. I like stories like Dr. Smith writes—he's really wonderful—but only a few stories are the opposite (terrible).

Now listen to this: In speaking of the ability of a person to stand high acceleration: When you first feel the motion of a car starting off you are pressed back in your seat. The faster you move in the slower passage of time—the more you feel the pressure. Yet, after you reach a speed of 50 or so M. P. H. and shut off the gas, at least let it stay steady, you don't feel any pressure. You will admit this. Now here is my point. Say for the sake of argument, the human body can stand acceleration from 0 to 50 M. P. H. in 20 seconds. Acceleration to 100 M. P. H. would only require 40 seconds, etc., therefore, to get up a speed of say 186,000 miles per *minute*—would only require 300 hours, at the comfortable rate of 50 M. P. H. increase every 20 seconds. Judging acceleration by deceleration, I have *stopped* a car from 50 M. P. H. in 15 seconds (involuntarily) and the only way it hurt me was in striking my head against the windshield. If it had been padded and if I had been tight against it I would have felt no discomfort.

I hope I have made my ideas clear to you. However, let me say one more thing. In your Edit. Comment, page 569, Sept., 1930 issue, you say that 300 M. P. H. is very trying to the crew of an aeroplane? You should have qualified this by saying "in making turns at this speed," for centrifugal force thereupon acts the same, according to the sharpness of the turn as if another acceleration were added to that already being experienced in the time taken for the plane to complete the turn. In other words, a plane moving 300 M. P. H. making a sharp turn requiring 10 seconds, would have the acceleration of the peak of 300 M. P. H. right in the middle of the 10 seconds, the balance of the 10 seconds tapering off at the start and finish of the turn. Straightaway at 300 M. P. H. won't bother any one after they have once gained this speed. Starting, stopping and turning are the only factors which would influence the human body in a serious way.

W. J. M.,
Macon, Ga.

(The speed of 300 miles an hour is trying to the crew of an airplane because they have to turn and change their course—they cannot go on in a straight line forever. They could, however, reduce their speed at the turns, if the plane would allow it. The point we wished to bring out and seemed to have failed in our attempt, is that sudden turns at high speeds, such as possible with airplanes are very trying and in many cases unendurable.—EDITOR.)

FROM A WOMAN READER

Editor, AMAZING STORIES:

Beyond question, A. Hyatt Verrill is the best of your authors. I sometimes read of his movements in the newspapers and wonder why he has never come to Washington to lecture at the Museum. I can assure him that a most attentive and intelligent audience (a quiet one, too) would be there to hear him. We take our lectures very seriously down here.

While I forget if it was published in AMAZING STORIES, the best story of the "Amazing" type I have ever read was "The Moon Pool."

The Discussion Department of the Magazine is to me a very important part of it. If you omitted it, I should feel quite badly about it. It would be better perhaps if criticism were made only in regard to present accepted fact. However, a question raised regarding the possibility of, or the steps already taken toward, establishing scientific theories should be given space and answered if possible. A good idea, I think, would be to let the author himself make the explanation.

Criticism of cover, artists, paper, etc., I consider childish, although I prefer a smooth paper.

I enjoy, for the most part, everything you publish, but prefer the longer stories and my brain is even capable of comprehending quite long serials. I find it a comfortable relaxation to ponder over the problems raised or solved in the instalments published while waiting for the next month's instalment.

"The World of Giant Ants" was a masterpiece, but numerous other stories can be praised in superlatives. "The White Army" which was instructive as well as interesting, is also the kind that I like. I find it quite easy to take doses of education in this entertaining manner.

I turn first of all to Dr. Keller's story, if there is one, although Mr. Verrill is my favorite. I tried to get a very young attorney who complained of the human frailties of stenographers, to read "Stenographer's Hands," but was only laughed at. Perhaps some one will kindly invent a machine to please the very young attorneys. They will, you know, employ eighth grade graduates with a six-months' business college veneer and expect the poor things to know as much about the English language as themselves.

Can you tell us, please, about the experiment made in Chicago concerning the foot-pounds of energy required to replace that expended daily by typists?

Irene Laun,
Washington, D. C.

("The Moon Pool" appeared in May, June and July, 1927. We agree with what you say about the Discussions Department in the magazine. The editor sometimes feels that he would like to have a magazine made up entirely of letters. Dr. Keller and Mr. Verrill are certainly among our very best authors. We have not got the figures of the Chicago test at hand, but as the average typist pounds the keys with her hands, perhaps you might better talk of the hand-pounds instead of the foot-pounds expended on the typewriter.—EDITOR.)

AN OPEN LETTER TO DR. MILES J. BREUER

Editor, AMAZING STORIES:

Through an unintended discourtesy I have ignored, for five months, your most kind and understanding letter about my work which was published in the April issue of AMAZING STORIES. I had the misfortune to lose my copy of that issue just when I was about to write you, and it was not until yesterday that I was able to secure another.

Besides acknowledging with thanks your compliments, I have wanted to say a few words about your own stories and about scientifiction in general. I cannot recall when I first began to follow your work, but it was some while ago. You are a prolific writer, and like all prolific writers you vary in quality. Most good writers, however prolific, do this; for it seems impossible to achieve an unvarying standard of quality in one's work without acquiring the sort of mechanical precision which belongs to the artisan rather than to the artist.

Your stories, at their best, I have always found to have much the same qualities that I try to achieve in my own—simplicity, a sound interrelation between human natures, and the illusion of reality which is always absent from what you term "vast, complex, labored efforts to soar and to cover the universe." I particularly enjoyed "The Gostak and the Doshes" because it seemed to me a very accurate satire on such Wilsonian catch-words as cause most wars, and because it was an interesting presentation of the concept of a fourth dimension from another point of view than the one I used in my story appearing (I think) in the same issue. I only hope you are not weary of having it praised.

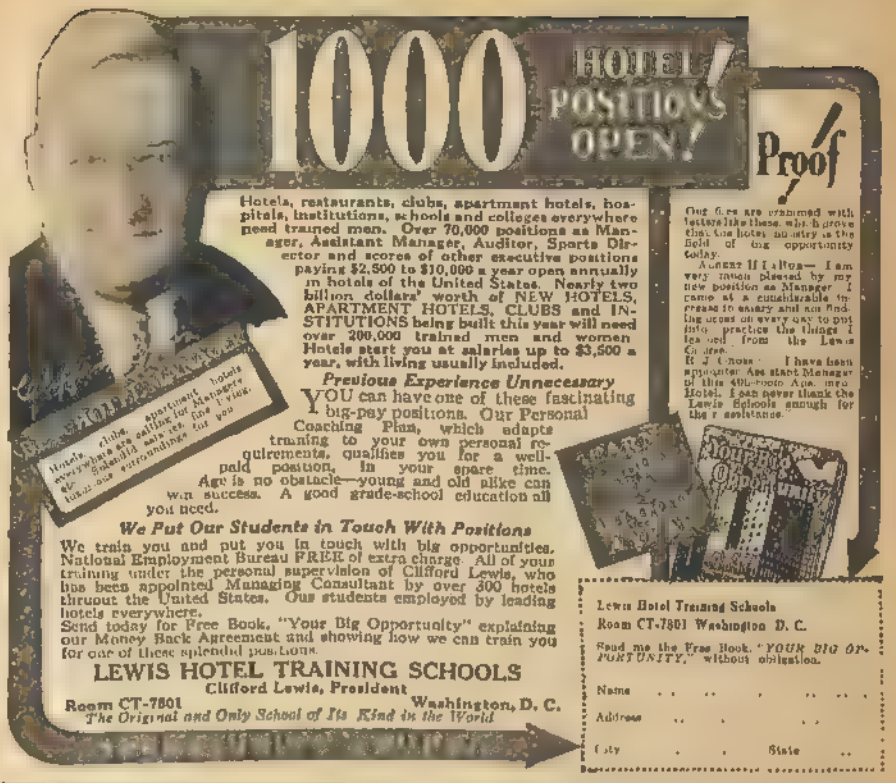
I am glad that you recognize my effort to make literature and not melodrama of this sort of fiction. Scientifiction belongs inescapably to the department of romance in literature; but romance, even in this period of realistic experimentation, commands respect when it is well done. Stevenson, Dumas, and Shakespeare have not yet been discarded—they were romantics. If they were writing now it is hardly possible that they would not occasionally at least interest themselves in the new romance that science has created. And they would not produce utter clap-trap of the sort which more than frequently dominates this field of romance—as, indeed, it has in the past more than frequently dominated other fields of romance. Even the Greeks had "popular" fiction.

The essence of good romantic writing, it seems to me, is the element of realism which must be combined with it. No good writing can quite escape from reality, but romance demands even more that is real than many works of the realistic schools demand. It must have reality to give a quality of wonder, by contrast, to its fantasy. Fantasy is not fantasy except in so far as it departs from reality (by a sort of intellectual relativity); the reader who is not constantly aware of this fact in whatever he happens to be reading will merely be bewildered, and probably bored. A single touch of fantasy in what is otherwise a realistic story will impart a mood of imaginative wonder that is oddly enough, often totally absent from those long, delirious tales of space-flyers and ant men which have no touch of reality in them.

Because I think you have recognized these conceptions of writing yourself, and have practiced them in your own work, I am very glad that you have noticed and enjoyed my stories. Although I suppose I should not write them if I were not occasionally paid for them, I think I can still truthfully say that my effort to reproduce in them life, as I have perceived and imagined it, is more important to me than the pay. I could not write them at all if I did not feel that I write some form of psychological truth. I am certain that your attitude must be much the same.

I hope that we shall both be able to continue admiring each other's work in AMAZING STORIES. And, most of all, I hope that our principles of writing may engage the attention of a few other authors of scientifiction who have ability. The romance of science is almost the only honest romance left in the modern literary world; it will be a pity if it cannot be developed into great literature as well as salable fiction.

G. Peyton Wertenbaker,
Richmond, Va.



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AN ENCOURAGEMENT FROM A LONDON READER AND EDITOR

Editor, AMAZING STORIES:

I see in your "Discussions Column" that you invite criticisms and suggestions for your magazines, so I take this liberty.

I know absolutely nothing about science and never have, so I say nothing about the science side of your stories. That is too far over my head. I am afraid I must admit that I buy your magazine merely for its fiction worth, as I prefer a stiff dose of what most people call the impossible in my reading, the more seemingly impossible the better.

Here is my opinion for what it is worth. Give us as many Interplanetary Travel stories as you can; you cannot have enough for me. "We want more Interplanetary Stories," as we used to shout for encores at school concerts. While I am on this tack, may I make a suggestion? We have numerous stories about Mars, Venus, Jupiter, and even Neptune, but none about Saturn and Uranus. Why are they left out in the cold?

I also like the Fourth Dimension and Into the Future stories, but ordinary Invention stories I do not care for. I don't know why, but they don't appeal somehow. Subterranean adventures I do like.

It was purely by chance that I picked up the January, 1930, issue, and since then I have bought it regularly. Carry on. There is no magazine like it published in this country.

If you have read so far, I thank you. Anyway, this will light the charlady's kitchen fire tomorrow morning, so I shall have done somebody a good turn. I was detailed for a year to attend to critics' letters for a magazine, so I know what is usually done.

Ian C. Knox,
28 Bloomsbury Street,
London, W. C. 1, England.

(It is rather interesting to receive a letter from a correspondent who disclaims all knowledge of science, yet we doubt if the science in our stories is one bit above his head. We do not believe that he does justice to his own abilities. We give a great many interplanetary stories, which are what you say you like. But, we have so many offered to us, that we have to be a little on our guard for fear we will get in too many in one issue. We admit that your idea of stories about Saturn and Uranus is a good one. We certainly think that some of our imaginative authors could make good use of the rings of Saturn. Jupiter is certainly very much in the cold, but we haven't left him there. He figured in a very interesting story which we published some months ago. It is very delightful to find an English reader speak so well of our humble efforts. Of course, the American does not always find it an easy task to please his brother across the seas and we, for some reason, have come to regard them as rather severe critics.—EDITOR.)

AN ANNUAL OF REPRINTS ASKED FOR

Editor, AMAZING STORIES:

Many of your readers ask for reprints. Many others object to them. You say that you feel that the magazine is to give new and original matter. Personally, I want reprints. I have devised an idea to satisfy those that want them and those that don't.

Publish an Annual in which only reprints are to be given. Those that wish them will buy it, those that don't want them won't have to buy it. This will be agreeable to all concerned. I earnestly wish that you would do this. Many times I have longed to see stories reprinted and I never see them.

I would suggest that you publish one long story and several short stories as in the Quarterly. Some stories I would like to see in the first issue are "The Moon Pool," "The Mad Planet," and "The Red Dust."

Donald A. Wollheim,
801 West End Avenue,
New York, N. Y.

(We think that your idea is a very good one with regard to an Annual made up of reprints. With the Monthly and the Quarterly on our hands we are pretty well occupied, but the Editors will certainly hope to be able to carry out your idea some time in the near future. We give so long a story in every Quarterly that it is fair to call it a novel; in other words we are doing, in the Quarterly, one thing you ask for in the Annual.—EDITOR.)

LIFE ON OTHER PLANETS. OUR COVERS AND PAPER

Editor, AMAZING STORIES:

I have been reading your magazine for some time and have not found anything as yet to kick about until recently. Will you please tell Mr. Cloukey to continue "Paradox +"; he leaves us all in the dark by making Sherman go to the telephone and then dash away in a taxicab without telling us the why or wherefore and ends the story there. I certainly do not consider this as the end of the story. I think that "A Visit to Suari" was very good; an occasional story like this points out to us how small and conceited we really are—thinking that there isn't any life on other planets except on our own small one. Those other planets were not put there for no reason at all; there is undoubtedly life on some of them, if not most of them. Please let us have some more stories by Edmond Hamilton, H. G. Wells and Stanton Coblentz who wrote "After 12000 Years" which was very good and appeared in AMAZING STORIES Quarterly some time ago, and some good reprints for the benefit of those who have not read your magazine until recently. I think the magazine cover of AMAZING STORIES is all right, so is the name, just keep up the color effect of putting bright objects on a darker background. You want your magazine to attract attention. The grade of paper is O. K. If you would make it too high a grade of paper, the price would go up, and then the readers would kick. I think that if some of these persons that criticise the magazine so much would take care to consider the problem on both sides, they would not have much left to criticise, although occasionally there are some stories which are not so good.

Edward Westfall,
209 S. Hanover St.,
Carlisle, Pa.

(The Discussions Columns are open for, and intended for, kicks or brickbats, as they are sometimes termed, and we feel that they give a sort of spice to the columns even when we are abused, or rather when the results of our humble efforts are abused. We are up against what seems to be an insoluble problem—that of life on other celestial bodies. Professor Jeans, who is at the very summit of the astronomical world, leaves us quite doubtful if there is life on any stellar body, owing to the conditions of temperature. But, of course, it is possible that there are other forms of life that can exist without air at high temperatures or even at the absolute zero. We know nothing about it. You would be surprised if you knew how much consideration is given to the cover of AMAZING STORIES, and the criticisms of many of our readers are curious, to say the least, and we are very glad when we get such a favorable criticism as yours. If the critics, instead of looking at them merely as a spot of color, would examine them more closely, they would find a great deal of design and what we may call "story" in every one of them. In one of the Gilbert and Sullivan operas, we are told that "the policeman's life is not a happy one" or words to that effect. It sometimes seems that the same could apply to the editors of AMAZING STORIES. "Paradox +" is going on to its conclusion. We are sure that you will like it. But stories inevitably vary in merit, and some of them please some readers and fail to please others and *vice versa*.—EDITOR.)

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SOME QUESTIONS ABOUT AIR, GRAVITATION, AND EFFECTS OF DISTURBANCES ON THE ATMOSPHERE

Editor, AMAZING STORIES:

Having just finished your August number, I wish to ask a few questions concerning the statements of Mr. Hansen which you printed in your correspondence section.

Concerning the effects of the nullification of gravity on our atmosphere; Mr. Hansen says that air is evidently not affected by gravity. If such were true, how does he account for what pressure is exerted on the surface by air? The weight of a solid or gas is due to the lesser or greater attraction of gravity for the substance, is it not? How then does air have weight and still not be affected by gravity?

Also Mr. Hansen speaks of the ability of air to replenish itself as an "uncanny property." I suggest that someone enlighten Mr. Hansen as to the properties of all plants in respect to replenishing the oxygen supply and refer him to the well-known law of conservation of matter.

One more question. What is the analogy between a furnace and a gravity screen? What corresponds to the asbestos? Also what effect could radio, telegraphy, or airplanes have on the atmosphere in the way of a chemical reaction?

I can sincerely say that I enjoyed every story in the August issue and look forward to the Quarterly, and the September number containing more "Skylark Three."

Lewis Cook, Jr.,
A[illegible] S. Crest Rd.,
Chattanooga, Tenn.

(Air is attracted to the earth by gravity. Just as the pressure of the ocean increases as one descends into its depths, so is the pressure of air greatest at the surface of the earth, which represents the greatest depth of the ocean of air in which we are immersed. And this increasing pressure of water and of air is absolutely due to gravitation.

The action of plants in evolving oxygen is very interesting and filling a transparent vessel with water, placing a lot of leaves in it and then inverting it in a pan of water so that no air enters, gives the basis of an experiment for collecting air from plant leaves. As for your three questions, in the next to your last paragraph which you have labelled curiously enough "one more question,' we hardly care to attempt to give answers. We certainly know of no such analogy as you refer to and we can see no way in which radio, telegraphy or airplanes could affect the chemical composition of the atmosphere.—EDITOR.)

SOME INTERESTING NOTES ON SEVERAL STORIES, AMONG OTHERS "THE ICE MAN"

Editor, AMAZING STORIES:

In your June issue you print a letter from Mr. Bridgeford, who says that if you ever print another story like "The Ice Man," he will make his son stop reading AMAZING STORIES. In retaliation, you print in the July issue, "A Visit to Suari," which is similar to "The Ice Man." However, I believe you were right to publish both stories. Your July issue was much better than the June. In the first part of "The Universe Wreckers," the author says if two of the exactly opposite force rays had happened to strike two asteroids at the same time, the ship would have been crushed by the rays. Yet Triton, pushing against the Sun and the Star in Sagittarius, both many times larger than itself, was not crushed. How was this? Otherwise the story was fine. I was glad to see "Paradox +" but the author leaves us when Ben Yun goes to get the germ culture R.J7a. And again he leaves the story unfinished. "The Driving Power," was pathetic. "Flamingo," humorous. "The Message from Space," well written, but the author does not describe the Astraklans; yet their picture was on the cover?

I side with Mr. Manzon on the reprint question. You say you think most of the readers would not like reprints. Why not have a vote on it? In closing, I will say that this is my first letter to you, so I hope it will not go into the waste basket.

Oren Larkins,
Detroit, Michigan

(We have had to say more than once in our Discussions Columns that the Editors not only regard "The Ice Man" as unobjectionable, but consider it extremely good. We are glad that you coincide with us. We would suppose that a space ship was more easy to crush than the satellite, Triton.—EDITOR.)

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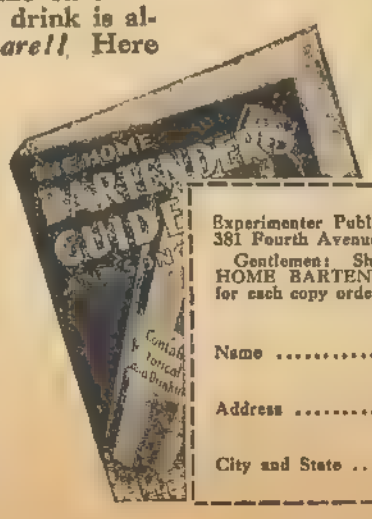

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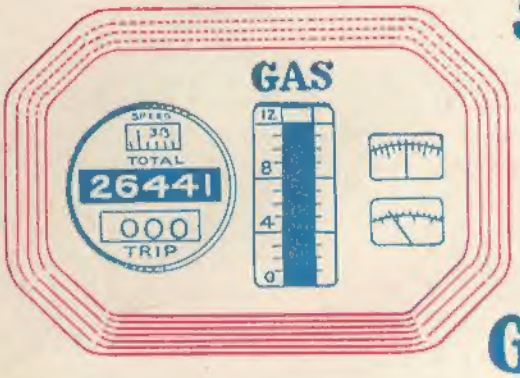

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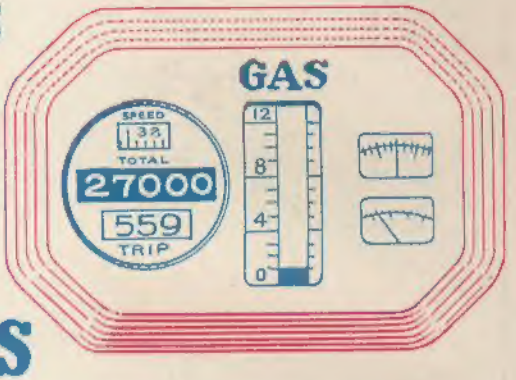

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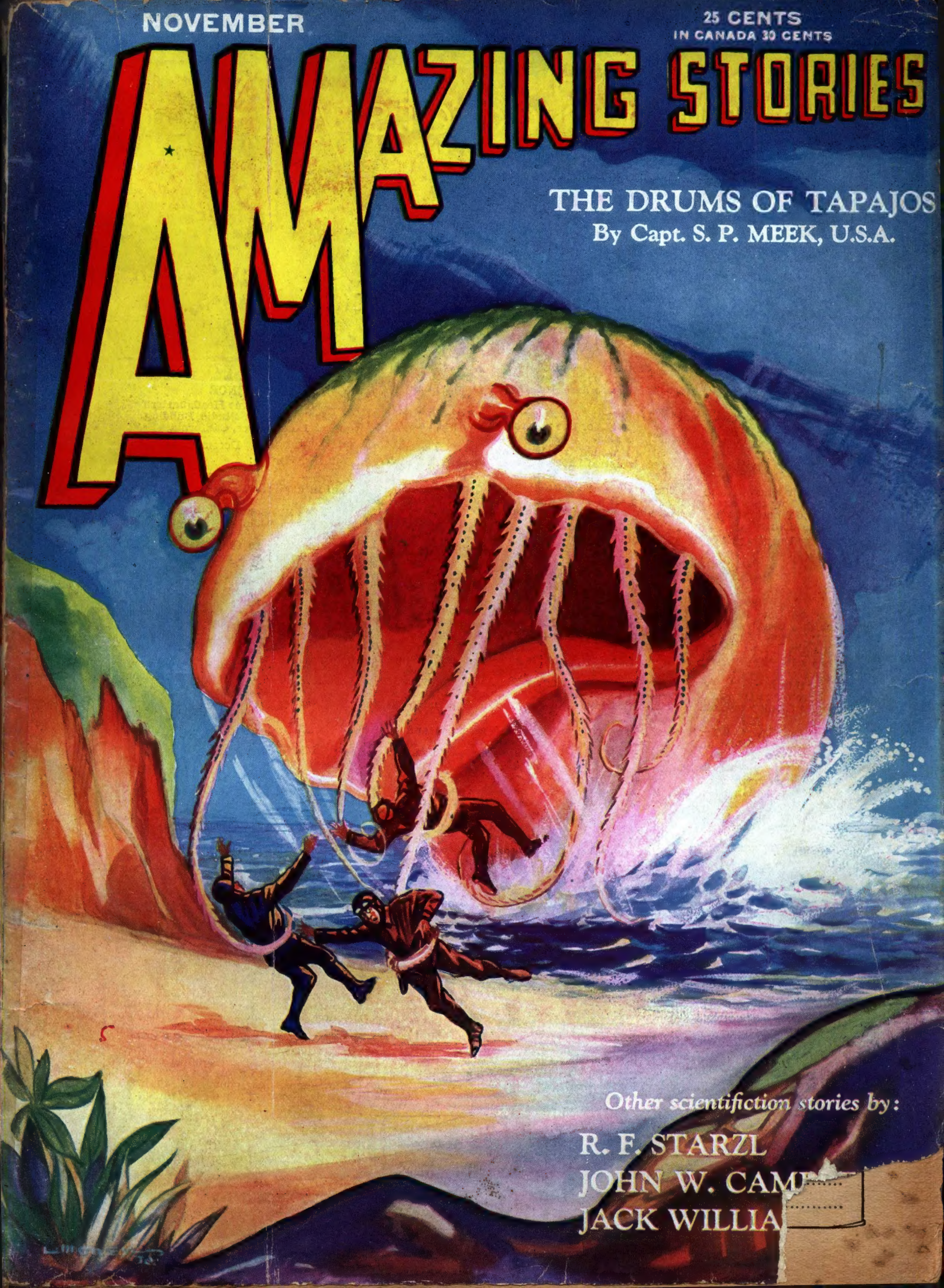

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